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The AIRCRAFT ENGINEER AND AIRSHIPS

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? ? - Paris

THE attitude of *Flight* towards the much-discussed New York—Paris air race is well known. Originally intended to commemorate Lindbergh's solo flight to Paris, the change of the date from May to August meant that the event would not take place on the tenth anniversary of Lindbergh's flight, and the fact that competitors may choose any time during August for their start changes the affair from a race into a contest. As a result, the Lindbergh Memorial Race has become a complete misnomer.

As long ago as last January, at the annual meeting of the American Institute of the Aeronautical Sciences, Mr. James H. Kimball, better and affectionately known as "Doc" Kimball, of the U.S. Weather Bureau, uttered a warning against the holding of the contest. Among other things he pointed out that the starting committee must make its weather analysis from reports received from some ten vessels, only one or two of which are likely to be within 100 miles of the great-circle course, and this information will refer to surface conditions; it will tell nothing of the conditions at the heights at which most of the competitors will be flying.

"Doc" Kimball suggested that the smallest meteorological organisation which could be tolerated would consist of ten vessels placed equidistantly from shore to shore, each carrying a meteorological unit equipped with pilot balloons, radio-meteorographs and seaplanes for bringing in reports on temperature and humidity in the upper air. Wireless for collecting this material and making it available to the starting committee would also be needed. "But," Mr. Kimball said, "given the possibility of satisfactory functioning of this system on the day of the take-off, is it reasonable to expect it to operate, say, twice daily from July 25 until the last contestant takes off?" It should be remembered that "Doc" Kimball has advised all the pilots on previous Atlantic flights and thus his opinions carry the greatest possible weight.

At the best, all twenty-two machines may get across safely. What will that prove? At the worst, many valuable lives may be lost, the general public in all countries will draw needlessly pessimistic conclusions, and liners will be diverted, at great cost, from their regular routes to look for aircraft reported down on the sea.

The American National Aeronautic Association has been entrusted with the organisation of the start. After studying the matter the N.A.A. expressed grave doubts concerning the advisability of holding the contest, and now the U.S. Government has definitely stated that the Department of Commerce will refuse to issue licences.

For the present the matter seems to have reached the stage so admirably summed-up in the current American phrase "So what?" Without the sanction of the American Government the race cannot start from American soil. There has been some talk of transferring the start to a Canadian aerodrome, but the Canadian Government may be no more enthusiastic than the American, and in any case a meeting of the F.A.I. would probably be required to alter the regulations. The next meeting of the F.A.I. is to be held in London in June. Even if the necessary agreement could be reached at that meeting the time factor has to be taken into account.

On the other hand, a number of individuals have spent a good deal of money on getting machines for the contest, and in case of postponement or cancellation they would have a legitimate complaint. France could, and doubtless would, reply that she was sorry, but that she was powerless to do anything, her prize offer still standing but the take-off point having suddenly been removed by an agency over which she had no control. Altogether the position is, from a legal standpoint, thoroughly muddled and not without its humorous side. If all the entrants institute proceedings, one can visualise a sort of repetition of the war debt vicious circle. An entrant may sue the national aero club through which he entered a machine. The club may sue the French Aero Club, which in turn may sue the French air ministry, which may "pass the buck" to the American Government. Certainly a good time should be had by all.

Range and Pay-load

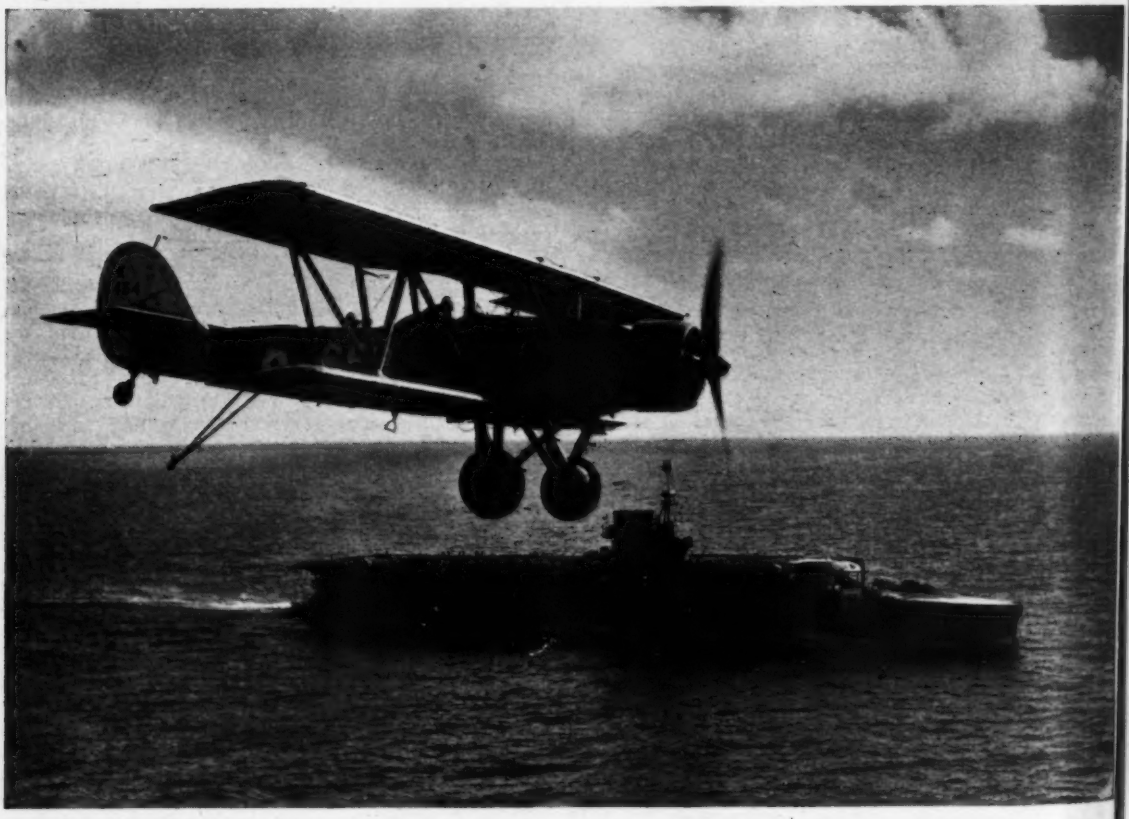
THE regrettable accident to the *Hindenburg* has focused attention once more on the problems connected with long-range air routes such as that across the Atlantic. Upon the conclusions arrived at by the American courts of enquiry may well depend the whole future of airships. The protagonists of lighter-than-air craft have a very good case for the airship as a carrier of passenger over long ocean routes on which no intermediate landings are possible. Until the *Hindenburg* disaster they could point to a long period of safe airship operation, but the fact that even a German-built and German-operated airship can come to grief in quite ordinary circumstances must of necessity shake the faith in airships. It may well be, of course, that an explanation is found which will satisfy everyone that a repetition need not be feared. On the other hand, it is well to take stock of the situation and to examine what would be the result of a possible cessation of all airship travel should the American investigations fail to bring to light a likely solution of the mystery.

Would, one may ask, the total disappearance of the airship rule out the possibility of regular trans-oceanic passenger-carrying air routes? Nothing is gained by over-enthusiastic claims, and in all truthfulness it has to be admitted that the long-range aircraft of heavier-than-air type which can carry a reasonable pay-load in the form of passengers over something like 3,000 miles of ocean, with reserve fuel for adverse winds, does not exist at present, nor is it in sight, in spite of the optimists.

The next question which naturally comes to mind is whether there exist any means whereby aircraft as we know them to-day can be improved to such an extent as to become commercial propositions over ranges of 3,000 miles. Further improvements in aero engines, and particularly in fuel consumption, will help, but will not give the complete solution. Improvements in aerodynamic efficiency will extend the commercial range a little farther, but will still not give us all we need.

So far as can be seen at present the most promising line of attack lies in adopting extremely high wing loadings, but for these it will probably be necessary to use some form of extraneous means of getting the heavily-loaded aircraft into the air. The Short-Mayo composite aircraft now nearing completion is one method of doing this. Catapulting is another, but the catapult may take many forms. Its main drawback is that long travel is necessary if unpleasantly high acceleration is to be avoided. Captain Frank T. Courtney has suggested a sloping runway on which gravity would assist the mechanical power. No one can foresee which of these methods is likely to provide the best solution, but it seems fairly certain that some form of assisted take-off will be the next big step towards long range with a reasonable payload.

Then will come the question whether the aircraft to be used for trans-oceanic routes should be of landplane or flying-boat type. For use with assisted take-off, this choice will be no easy one.



FOR ROYAL REVIEW : H.M.S. *Courageous*, which, together with *Glorious* and *Furious*, will be among the 277 vessels assembled at Spithead for the Royal Review to-day, Thursday. The aircraft is a Blackburn Shark T.S.R. with Siddeley Tiger engine.

The Outlook

A Running Commentary on Air Topics

Thank You for Little

LAST week's announcement by British Airways to the effect that prospective passengers by their services to the Continent will in future be able to book in the normal way through the principal travel agents comes as good news to the initiated. To the ordinary member of the travelling public, however, such a statement must appear to be a very strange one. What are the travel agents for if not to book passengers by any route or service preferred by the traveller himself? He is obtaining a "gift" which, in fact, should already be his.

For some considerable time, in and out of season, *Flight* has attacked this ridiculous anomaly wherein British travel agents have not been able to book passengers on services operated by their own nationals. Constant dripping may or may not wear away a stone, but the amusing part about this affair is that the general public, whose servants the railway companies are supposed to be, have shown so little interest in their natural rights.

Even as it is, however, the "gift" is an extremely small one. It is still apparently impossible to book on British Airways' own subsidiary internal routes or on the internal and future external routes of any British company other than Imperial Airways, Railway Air Services and Jersey Airways.

According to Schedule

THAT it *is* possible, in spite of the many difficulties which arise out of the R.A.F. expansion scheme, for an aircraft firm to be up to, or even slightly ahead of, schedule is indicated by an article in this issue dealing with the production of the Handley Page Harrow heavy bomber. Although the structural methods employed are totally different from those of early Handley Page machines there is probably significance in the fact that the Harrow has been designed and built by the firm which championed the large aeroplane in the early days, when it was held by most that the "cube law" would result in a large aeroplane being less efficient, from a structural point of view, than a small one. Mr. Handley Page's reply to that argument was that the larger size of components made possible a number of refinements which were impracticable in smaller machines, and that this fact more than outweighed the "cube law" obstacle.

Mr. Handley Page must have been just as convincing a talker in those days as he is now, for he succeeded in convincing the powers that be to the extent of getting an order for a large machine, which was built and flown somewhere in 1916, and from which grew the famous o/400.

In the Harrow the Handley Page company has improved upon the original argument in that not only has a large machine been built which has a very good ratio of gross weight to tare weight, a ratio which *Flight* has for many years used as a figure of merit in relation to structural efficiency, but this ratio has been secured in spite of the employment of structural designs which place ease of production ahead of sheer strength-weight considerations.

Unfortunately, actual figures may not be quoted at the moment, but the Harrows are leaving the factory in a steady stream, and are being delivered to R.A.F. Squadrons well on time. This seems to be the best possible vindication of the design policy followed in producing the type, especially as performance is well up to the standards expected in a machine of this class.

Cheating the Atlantic

DICK MERRILL and Jack Lambie may be said to have double-crossed the Atlantic by leaving New York on Sunday, May 9, flying to London and returning to New York by May 14. Actually, the expression is fairly just, since it indicates cheating, and that is still what these spectacular flights amount to. The two airmen have won the just admiration of the world for their double dash across, and have shown that with a properly equipped aeroplane, handled by a trained crew, the flight between New York and London, and vice versa, can be made in certain weather conditions. Apparently these conditions were none too good, but, on the other hand, it would be unwise to jump to the conclusion that the flight can always be made. Much experience will be needed before it is possible to say with certainty on how many days of the year the flight can be carried out.

In the meantime it can be said that this was the first really *bona fide* charter flight across the Atlantic. Dick Merrill and his partner brought over films of the *Hindenburg* disaster, and they were to have taken films of the Coronation back to America. Owing to some hitch, the films were not, apparently, delivered to them in time for the return journey, and they had to be content with "stills," but, except for the fact that Merrill's revenue was probably sadly diminished as a result, this does not really affect the argument.

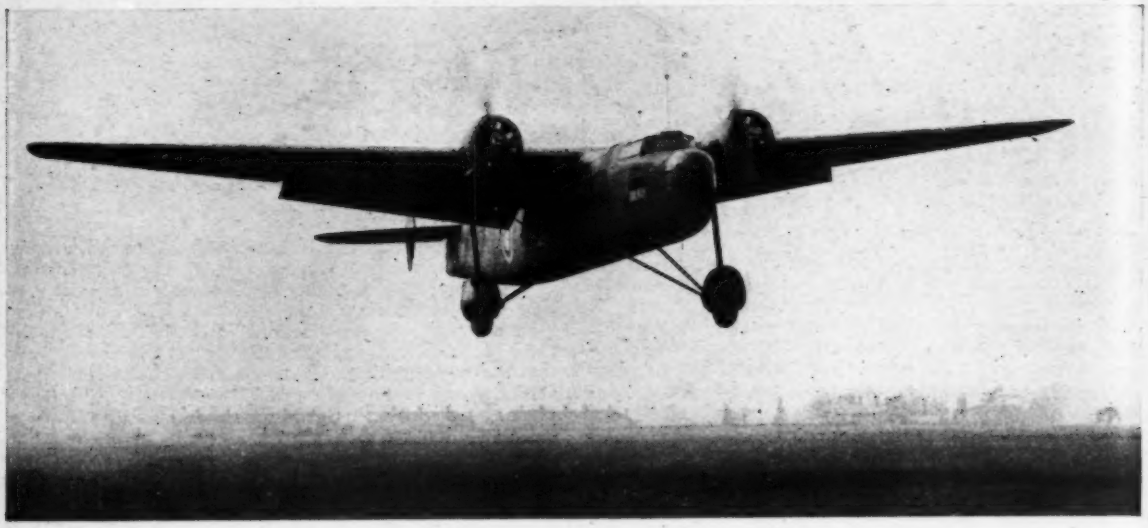
There is, of course, a great deal of difference between such a charter flight and regular services which have to operate day in and day out all the year around. In the one case it is permissible to take chances; in the other complete safety must be aimed at, or at least safety comparable with other means of transport.

Ad Astra

SUBJECT to official homologation by the F.A.I., Italy has captured from us the world's altitude record established last year by Squadron-Leader Swain on a Bristol monoplane with Bristol Pegasus engine. It is to be expected that the Bristol monoplane with Rolls-Royce engine will soon be put to the test, and technicians will watch with interest the information thus gained. There is a school of thought which holds that, for extremely great heights, the liquid-cooled engine scores over the air-cooled in that there is obviously a limit to the extent to which the fins of air-cooled cylinders can be increased, while the liquid-cooled engine can be given a radiator of any size within reason.

The Italian record was established with a biplane fitted with a two-row radial air-cooled engine; the British record was also established with an air-cooled, and the previous Italian record with a British air-cooled built under licence in Italy. Thus, from practical experience the air-cooled seems to have done most of the work so far, but that, of course, is not necessarily proof that the liquid-cooled cannot, when specially adapted to the purpose, do even better. In fact, we believe that some Italian authorities share this view, and that the use of an air-cooled in the last attempt was dictated by considerations of what was immediately available rather than by what may ultimately be evolved. Thus, there is quite a possibility that, should Great Britain succeed in beating Lt.-Col. Pezzi's record with a liquid-cooled, Italy may retaliate with a still later type of engine of this class.

DIARY OF FORTHCOMING EVENTS—PAGE 500



DESIGNED for PRODUCTION

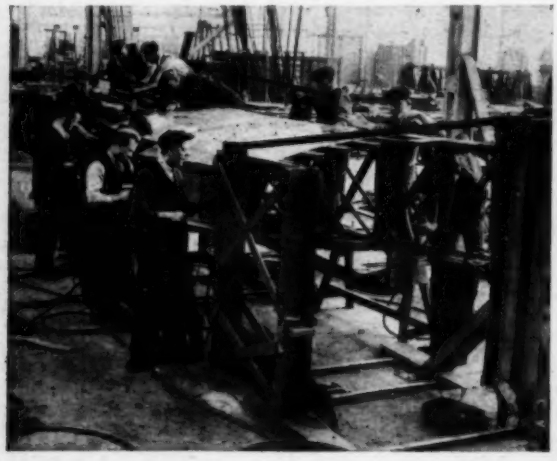
How Careful Original Planning Has Brought Drawing Office and Shops Together in the Handley Page Harrow

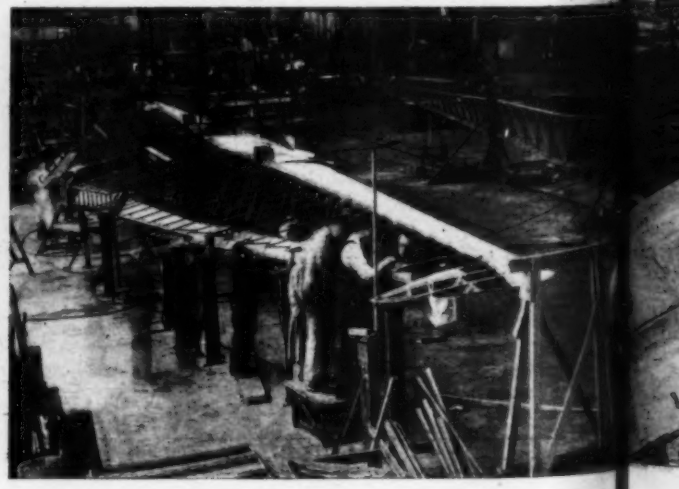
(Illustrated with "Flight" photographs and sketches)

AT a time when a great deal of criticism is being levelled at the delay in production of aircraft for the R.A.F. expansion scheme it is encouraging to find that at any rate one firm is up to schedule in the matter of production of a new type for the R.A.F. The type is question is not one which, at first sight, one would expect to lend itself particularly to mass production; but it is, nevertheless, a fact that the Handley Page Harrow heavy bomber is now being produced according to, or even a little ahead of, schedule. The machine, as *Flight* readers will know, is a high-wing monoplane with Bristol Pegasus engines mounted in the leading edge of the wing and a fixed undercarriage with "spats" over the wheels.

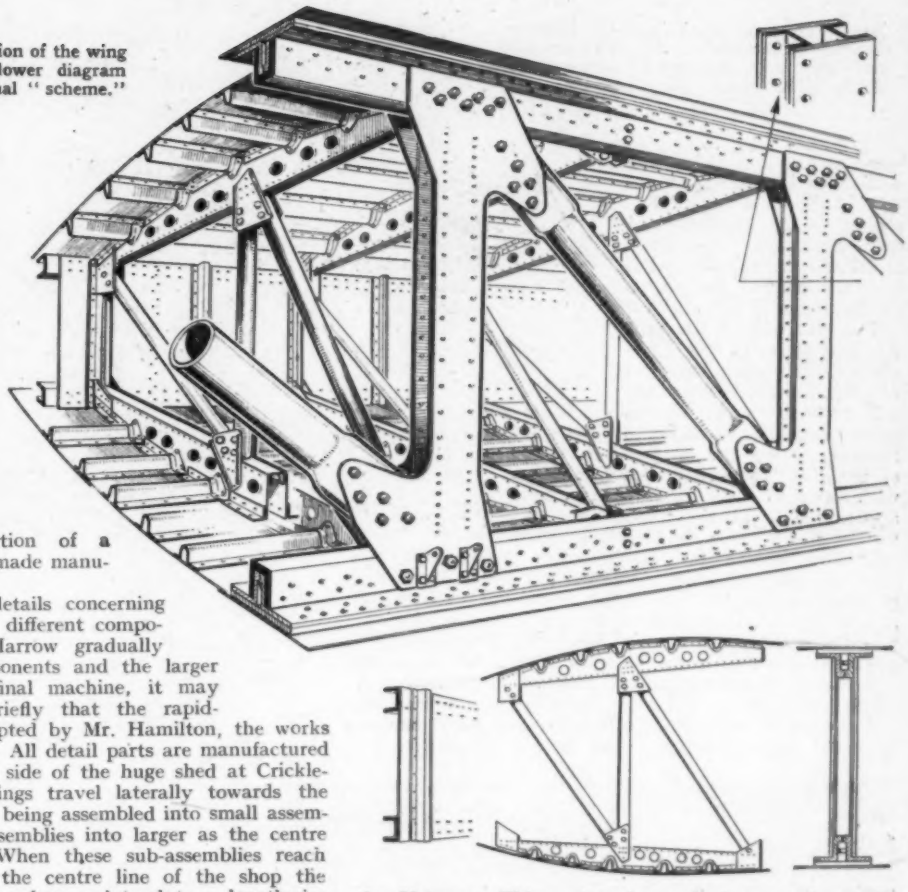
The machine is of orthodox layout and an external examination does not give any indication that the Harrow has been designed specifically with rapid production in view. When, however, one is given an opportunity of going through the shops at Cricklewood and seeing the work going forward there one very soon realises that the very closest co-operation has existed between the drawing office and the shops during the early stages of the design.

One quickly forms the impression that what happened during the design stages was that the drawing office submitted certain drawings to the works. The works looked at them and said: No, it didn't quite lend itself to rapid production, but if it could be done without adding too much extra weight, what about doing it in such and such a way? The drawing office had a look at the works' suggestion, and replied: Well, they didn't altogether like the arrangement, but here was an alternative which might do. The works examined the alternative and





Above, centre section in its jig. On the right, the three main portions of a wing being assembled.



Details of the construction of the wing centre section. The lower diagram shows the constructional "scheme."

said: Yes, that would suit them from a production point of view.

This, of course, was not exactly how it came about, but the effect was much the same. Actually, one imagines that numerous conferences between the representatives of the drawing office and the various shop departments were responsible for the ultimate production of a detailed design which made manufacture easy.

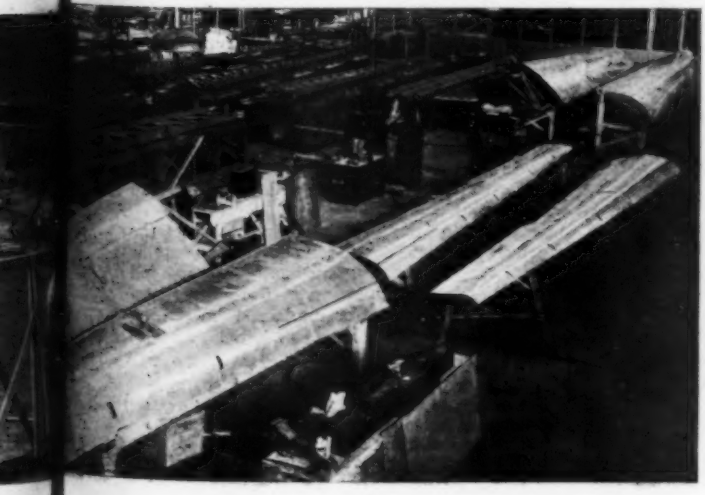
Before going into details concerning the way in which the different components of the H.P. Harrow gradually grow into larger components and the larger components into the final machine, it may be explained quite briefly that the rapid-production system adopted by Mr. Hamilton, the works manager, is as follows: All detail parts are manufactured in the shops along the side of the huge shed at Cricklewood. The small fittings travel laterally towards the centre line of the shop, being assembled into small assemblies and the small assemblies into larger as the centre line is approached. When these sub-assemblies reach the neighbourhood of the centre line of the shop the direction of flow changes from a lateral to a lengthwise one. Thus, the final stages consist in the large assemblies travelling down lengthwise, to finish up at the far end of the shop, where is situated the dope room, in which the machine receives the different coats of dope and the camouflage paint used for heavy bombers.

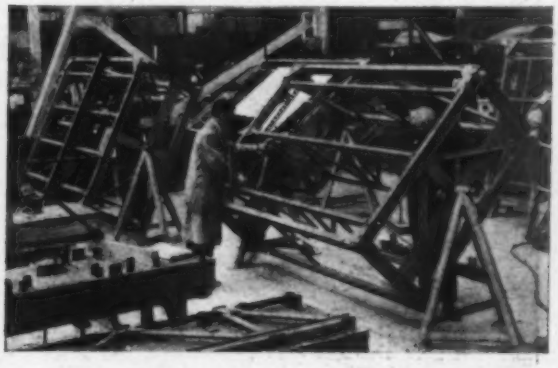
It is not proposed to deal here with the manufacture of small fittings, which is much the same at Cricklewood as in any other aircraft works. The really interesting part is the method of assembly and the detail design which has made this method possible.

Unit construction is the keynote to the production of the Harrow. This system has only been made possible by the special detail design which was planned from the start with a view to making such production possible.

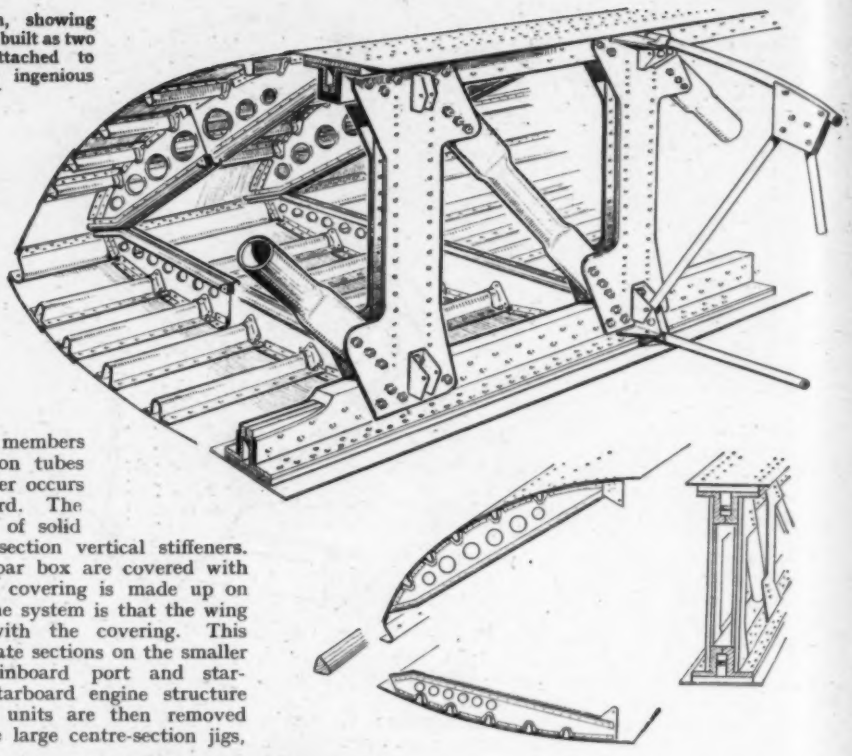
Before explaining how the huge cantilever wings are manufactured and assembled it is necessary to mention some of the features of its design. Briefly explained, the wing consists of three major sections, the centre section and the two outer portions. The centre section in turn is made up of smaller units before it finally reaches the large jig, on which it is ultimately assembled and made ready for "offering-up" to the fuselage.

The main centre-section structure consists of what may be termed a box spar, which is roughly of rectangular section. The corners of the spar box are extruded





The bomb cage (above) is built as a complete unit in a swivelling jig. On the left, outer wing portion units. Note that the skin covering already has its proper camber.



Details of outer wing portion, showing how sheet-metal nose covering is built as two complete units, afterwards attached to single girder spar. Note the ingenious leading edge joint.

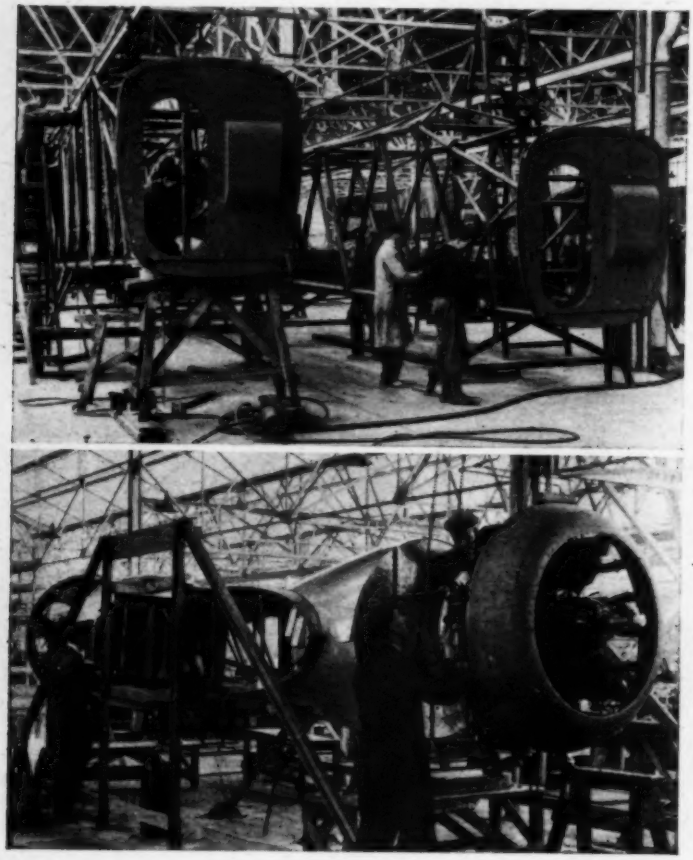
sections of duralumin, a number of laminations of "L" section being covered and held together by an unsymmetrical "Z" section placed over the bent-up flanges, as shown in the sketches.

The rear wall of the spar box is a girder of "N" formation, the vertical members of which are of built-up channel sections with flanges turned outwards to facilitate riveting, while the diagonal members of the "N" are circular-section tubes with flattened ends. This girder occurs approximately at the mid-chord. The front wall of the spar box is of solid duralumin plate with channel-section vertical stiffeners. The top and bottom of the spar box are covered with duralumin sheet plating. This covering is made up on smaller jigs, and a feature of the system is that the wing ribs form an integral part with the covering. This plating is made up in five separate sections on the smaller jigs, i.e., a centre unit, an inboard port and starboard unit and a port and starboard engine structure unit outboard. These smaller units are then removed from the jigs and taken to the large centre-section jigs, where they are put on the spars already held in place ready to receive them.

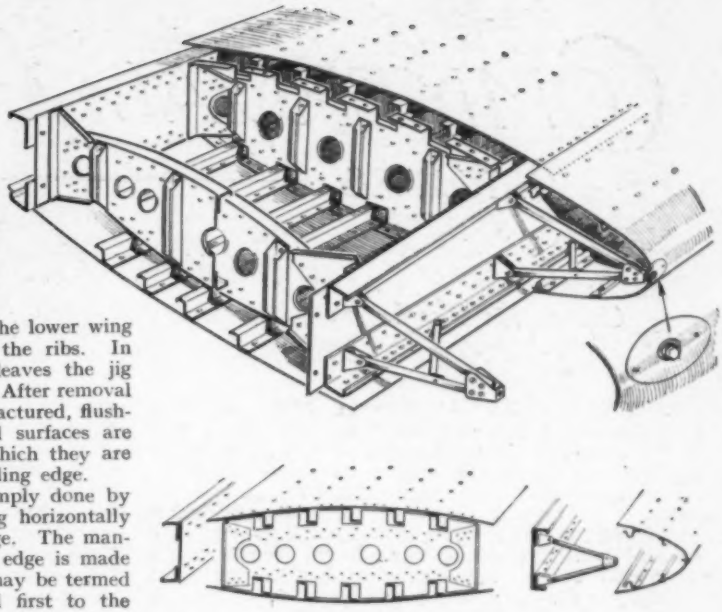
When the centre-section unit has been completed on its jig it is removed and travels lengthwise down the shop to the next position in the production line, where the engine mountings are put on. These mountings, complete with engines, have, in the meantime, been assembled on other jigs and have flowed laterally towards the production line. Here, also, as much as possible of the necessary "plumbing" is done. This is obviously very convenient, as all the corners which would be awkward of access once the centre section was in place on the fuselage are quite easy to get at while the unit is on a jig, and the relatively small number of men working on the centre section do not get in one another's way.

It is in the construction of the outer wing portions that the really clever production methods are chiefly to be found. Like the centre section, the outer wing portions consist of a composite type of construction, but the area from the leading edge to the girder spar is covered with sheet metal, while the rear portions have tubular girder ribs covered with fabric.

In order to facilitate the construction of the sheet-metal planking as a complete unit a special type of construction has been employed in the leading-edge portion of the wing. Perhaps this can be better explained by stating



The fuselage, although of girder construction, is also built in several units. The upper picture shows two, with their front gun turrets carried on metal-covered structures. On the left is the mounting and cowling of one of the Bristol Pegasus engines on the wing leading edge.



The ingenious tail construction. Top and bottom coverings are first attached to the tailplane ribs; then the "box" is completed by riveting-on the front and rear channels, and finally the leading edge unit is attached.

that the wing is split horizontally through the leading and trailing edges. The upper and lower sheet-metal covering for the whole outer wing portion is manufactured on sloping jigs as a complete unit. To make this possible the ribs are also split chordwise—that is to say, the upper wing covering carries the upper part of the ribs and the lower wing covering the corresponding lower half of the ribs. In this way each top and bottom covering leaves the jig as a complete unit, with its final curvature. After removal from the jig on which the covering is manufactured, flush-riveted and assembled these large, curved surfaces are transferred to the final assembly jig, on which they are attached to the girder spar and to the leading edge.

Attachment to the girder spar is very simply done by flush-riveting through to a channel running horizontally along the top and bottom of the spar flange. The manner in which the final joint in the leading edge is made is very clever. A duralumin strip of what may be termed "distorted Z" or "S" section is riveted first to the top covering. When the top and bottom surfaces are brought together on the jig, the two leading edges are very readily fastened together, as the lower edges are entirely free and "getatable." The final riveting having been done there remains a groove running the entire length of the leading edge. This groove is filled with a strip of wood to give the rounded, smooth contour of the extreme leading edge.

It is in the tailplane and fin of the Handley Page Harrow that the particular system of production is seen to the best advantage. This is because the tailplane, instead of being of composite form of construction like the wing, is entirely a stressed-skin structure. The top and bottom coverings are made up as units with their spanwise stringers of "Z" section and with solid sheet-metal ribs having circular flanged holes for lightening. The front and rear walls of the tailplane spar box are formed by solid sheet-metal channels which have the flanges turned outwards, so that riveting them to the top and bottom coverings is a very easy operation. As our sketches show, there are no awkward corners at all.

The leading edge of the tailplane forms a separate unit and is carried by tubular brackets springing forward from the front spar wall. These brackets are of "V" shape with the apex facing forward. In the apex of each is a threaded hole for the reception of the special large-headed bolts used for holding the leading edge to the brackets. Where the leading edge sheet metal is fastened to these brackets a slight, cup-shaped indentation is made, so that the heads of the securing bolts lie flush with the leading edge. The fin is of very similar construction.

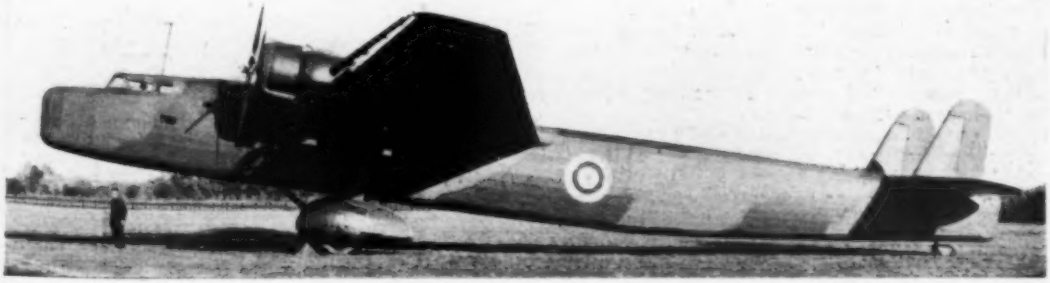
The fuselage of the Handley Page Harrow is entirely of tubular construction as regards its primary structure. It is made up in three main sections on separate jigs, of which the front portion may almost be said to form two in one, as there occurs in it a considerable change in size (i.e., diameter) of the longerons.

The extreme forward end of the fuselage is a metal monocoque jig-built unit and carries the forward gun turret. The rear edges of this monocoque structure are riveted to a bulkhead built into the forward part of the tubular portion of the fuselage.

After leaving the jigs on which the three main fuselage portions are assembled the units are brought together on the centre line of the shop and bolted together into the final complete fuselage.

It still remains to give the fuselage a rounded external shape. This is accomplished by a light structure of formers and stringers. It has been found that wood is a suitable material for this kind of construction, and it is interesting to find that these wooden fairings are all made up on separate jigs as complete units, being afterwards strapped to the longerons of the fuselage. The fabric covering is then stitched on and the complete fuselage passes into the dope shop for final doping and camouflaging.

When the main components have been completely finished and the internal equipment has been installed they are transported as units out to the aerodrome at Radlett. In the shed at Radlett the final assembly takes place and the machines are finished off ready for test.



The completed Harrow. The engines are Bristol Pegasus. Note the pronounced taper of the wings.

COMMERCIAL AVIATION

— AIRLINES — AIRPORTS —

THE WEEK AT CROYDON

Coronation Traffic : Co-operative Efficiency : Ground Control Needed : The Booking Ban : International

CORONATION-WEEK traffic was excellent, and things went fairly well except for the night flying over London and the coast towns, which was spoiled by weather, though the demand was exceedingly brisk. Apart from long-distance flights with films, such as the American and Japanese ventures, there was considerable activity taking, or attempting to take, pictures to different parts of England, especially to the north. Weather again intervened, but one firm, not easily defeated, sent off a multi-motor wireless equipped machine which got through after a single-engined machine of theirs had been forced back to Croydon. None of the taxi firms could compete with the bookings during last week, and were seeking for assistance from each other and from all and sundry. Le Touquet and Deauville were the popular resorts, and it was interesting to study the crowd waiting to go to these places. You would call them first-class passengers, I suppose. I saw several nice-looking people and the rest were rich and discontented. Most women had anticipated the sun bronze they hoped to acquire, and there was hairdressing seldom seen outside a barber's window. One woman, tall, thin, painted brick-red and with flame-coloured hair, looked more like a factory chimney afire at the top than a human being.

Team Work

Regular air services, British, Dutch, German, Swiss and Belgian, were all full up on Friday and Saturday, and many were duplicated. Good team work was to be seen when Imperial, Air France and K.L.M. all had twenty or more passengers to pass immigration at the same time. The white-capped staffs of the three firms helped each other to keep the three bunches apart, and made them form up into queues. These rush periods show up weak points. One is ground traffic control—nobody's business at present, though it should be done by the control tower people. I saw one big four-engined machine with passengers, pilot and crew aboard, all ready to go at the correct time but unable to move owing to inconsiderate parking of other machines in front of and around it. A tractor had to be obtained and the machine, complete with load, was pulled some way backwards, a most ignominious proceeding. Result, late departure which could have been avoided by a central and neutral ground traffic control authority. Then, too, "Emmigration," who are also "Immigration," was caught napping by practically continuous streams of outward passengers (who must have preference), so that incoming passengers had to wait far too long before passport examination

A visitor seldom seen at Croydon was a red, silver and black Danish Junkers Ju52, belonging to D.D.L. (the Danish Air Company), and flying a red flag with a white cross on it. The pilot was very smart, yachtsman fashion in white ducks, and a top-hatted director of the company was aboard. It was a special machine to convey the Crown Prince and Princess of Denmark home after the Coronation.

Both Lord Forbes and Lord Amherst earn their living as civil pilots, one is with Personal Airways and the other with Olley Air Service. A story goes that one of them had to hurry out of Coronation robes in order to fly pictures of the ceremony to another part of England. Regular air companies, incidentally, were much harassed by wild Press despatch riders arriving with last-minute photos to go on board. Some firms have a rule that delays thus caused cost the Press agency a guinea a minute. I doubt if the regulation is ever enforced.

Congratulations are due to British Airways, who have succeeded in getting the Railway Clearing House ban removed. This means they are now on equal terms with other companies plying for hire between England and the Continent, and all the big travel agents may now book for them by kind permission of the Railroad Dictators. Incidentally, little credit appears to be due to the railways, on whom, I hear, considerable pressure has been brought to bear, not by British Airways but by independent persons. British Airways' internal services are still under the embargo—as are those of all other firms trying to earn an honest penny by carrying passengers from place to place in England.

K.L.M. recently booked its 500,000th passenger through Thos. Cook's Amsterdam office. The lucky man was presented with two free return tickets to any place on the company's network of air lines. Amusing, by the way, was the description in a contemporary of the K.L.M. Douglas D.C.3 at the R.Ae.S. Garden Party, Heathrow. "The K.L.M. Douglas," says he, "flying the only flag to be seen, the Netherlands colours" (actually it was the company's house flag), "on an American aeroplane." According to the company's Croydon manager the description hardly did justice to the international character of the proceeding. The machine had several British employees of the Dutch company on board, as well as a Canadian journalist, and Miss Sheila Martin, here to represent the women of Australia at the Coronation. I am credibly informed that the steward was serving Scotch whiskey, French and Italian vermouth, and for all I know German lager beer and Russian vodka as well.

One of the companies at Croydon recently received a telegram from the Continent reading: "A son stop thanks to inimitable efficiency your service I walked in just in time to congratulate him on his arrival," and signed "Proud Parent."

A. VIATOR.

The New African Route

THIS week, and from now on, the South African mails will be carried through to Durban by flying boat. The flat mail rate does not come into action until next month and the first outward trips are probably in the nature rather of delivery flights, since the route will be divided into three operational sections, with bases at Alexandria, Kisumu and Durban. As far as Nairobi, in the outward direction, the boat route is very similar to that used by the landplanes, but thereafter the boats will fly down the east coast via Mombasa, Dar-es-Salaam, Lindi, Beira and Lourenço Marques. From Durban, of course, mails and passengers are taken over by South African Airways.

Singapore's Aerodrome

ON May 12 the new aerodrome at Singapore, which has already been described in *Flight*, was officially opened. Within two miles of the city centre, this aerodrome is one of the largest (if not the largest) on the Empire routes. The runways are something like 1,000 yards in length and the aerodrome site, which was once a swamp, is bordered on one side by the sea, where the Geylang channel has been dredged and a slipway has been constructed for use by Imperial Airways' and Service flying boats.

There are six floodlights as well as the usual boundary and obstruction lamps, and the short- and long-wave D/F equipment is already in action. A particularly interesting feature of the layout concerns the shape of the landing area itself. Since the entire area has been, so to speak, built on a swamp it was possible to arrange it just as required. It is, in fact, circular, with a smoke smudge in the centre and a taxying strip around a third of the circumference.

Bellancas for Air France

TWENTY Bellanca "28-90" high-speed monoplanes, generally similar to the *Dorothy* (née *Irish Swoop*) but fitted with Pratt and Whitney Twin Wasp engines in place of the Twin Wasp Junior of the prototype, have been ordered by Air France for the carriage of mail on internal air lines. Later plans may involve their use on colonial routes.

The first group of machines will be exported to France within the next few weeks. Test flights have indicated, according to an announcement by the manufacturers, that the machines will be the fastest commercial aircraft in the world, which seems a very reasonable claim in view of the fact that the Twin Wasp Junior-engined version does 275 m.p.h. On the first take-off made by the vice-president of the Bellanca Co. in the new model, only half the available power output was used.

The "28-90" accommodates a crew of two and 1,000lb. of mail. The wings are of two-spar wooden construction, the bracing being effected by a system of tie-rods to the top of the fuselage and to two faired supporting struts at the bottom. Plywood is used to cover the leading edges and the top of the wheel wells. Landing lights are recessed into the leading edge. The fuselage is of welded chrome-molybdenum tubing, the structure round the mail compartment being formed of relatively few large members.

The Twin Wasp engine specified develops a maximum of 950 h.p. at 2,550 r.p.m., the critical altitude being 6,000 ft. An N.A.C.A. cowling of very long chord is fitted, incorporating a sturdy nose ring and four readily removable side segments. Oil under pressure from the engine lubricates the valve rocker boxes and an oil radiator with an adjustable scoop under the control of the pilot is situated adjacent to the cockpit.

True Benevolence

FOR some time the Court of the Guild of Air Pilots and Navigators has held the opinion that a substantial benevolent fund should be in operation for professional pilots or their dependents. During the past year no fewer than ten members of the Guild have lost their lives in flying accidents, and in some cases it has transpired that little or no provision has been made for their widows and children.

In order to ensure that such provision shall be available, a charitable trust, known as the Guild of Air Pilots Benevolent Fund, has been legally constituted and rules have been adopted which provide for its administration by members of a representative committee. A number of donations have already been received or promised and Lord Derby, the Duke of Westminster, Lord Leverhulme, Lord Lloyd and Sir Knaston Studd have consented to become vice-presidents.

Nevertheless, it is essential that the fund should be adequate to meet all needs and a sum of £50,000 is aimed at in the preliminary appeal. As air transport develops such a sum will not be considered in any way unreasonable, and charitable support should only be necessary in the early days of the industry when few of the companies concerned are in a position to arrange their own pension funds.

All those who believe in the future of air transport, and who realise that flying must necessarily be carried on for the present with at least some of the hazards of experimental work, will feel a sense of responsibility to the personnel who are building up the services. The honorary organiser of the Fund appeal is Mr. F. W. Jones, Room 172, Airport of London, Croydon, Surrey.

Trans-Canada

THE Canadian Department of Transport has received the first of the fast mail machines which are to be placed on the trans-Canada airway. This, a Lockheed 12A, is being used for radio beacon and communication testing prior to the opening of the service.

Incidentally, the department has appointed four new assistant inspectors to the civil aviation branch, bringing the total to twenty-two. They are K. F. Saunders, formerly in charge of the St. Lawrence River north shore air mail, who will be stationed at Rimouski on the St. Lawrence; Donald Saunders, formerly instructor at the Halifax Air Club; F. M. Carter and G. C. Upson, both former members of the Saskatchewan Government Air Service.

Commercial Celebrations

AS a small informal celebration of two years' successful operation and expansion Mr. and Mrs. Stace, host and hostess for Air Commerce, of Heston, entertained some fifty guests to a very pleasant luncheon in the club on Tuesday of last week. It was intended during the afternoon to fly the guests over the Fleet in the Thames Estuary, but the prevailing conditions ruled out all such hopes.

A radio telegram was received during lunch from the Gaumont British people congratulating Air Commerce on flying 100,000 miles for them without mishap—and this message gives a better idea than anything of the amount of work carried out nowadays by charter companies. Besides their transport contracts, Air Commerce carry out most of the charter work for British Airways. A three-months' trip to Khartoum has recently been completed, and a further trip to Istanbul to bring over five ladies in strict purdah is in progress, the special arrangements entailed including the clearing of aerodromes for arrival and the fitting of blue glass cabin windows.

The Air Commerce stable is now composed of two D.H. Rapides, two D.H. Dragons, two D.H. Leopard Moths, a Miles Falcon, and a Percival Vega Gull. The ultimate aim is to use multi-engined machines throughout for passenger work.

More D.C.4 Details

PARTICULARS of th long-heralded Douglas D.C.4 Transport have been trickling in spasmodically and the latest information to hand is given hereafter.

The wing and fuselage, although typically Douglas, differ in a number of features, apart from size, from those of the D.C.2 and D.C.3. For example, the wing, although retaining the characteristic leading edge sweepback and straight trailing edge, lacks the parallel-sided centre section featuring in the earlier machines.

Points of outstanding interest are the "tricycle" landing gear, the arrangement of which was shown in a sketch in last week's issue of *Flight*, the triple-ruddered tail unit and the 9½-degree dihedral of the tailplane. The inboard engines are toed-out at 2½ deg. and the outboard units at 6 deg., presumably to get ample slipstream on the tail surfaces. The flaps are of generous size and conventional design, extending partially beneath the fuselage to eliminate the third panel used on the D.C.2 and 3. Cargo is stowed in a belly compartment beneath the passenger cabin.

From floor to ceiling, the cabin measures about 7½ft., the width being 10ft. Forty people will be accommodated during the day and, when the machine is used as sleeper, there will be room for thirty double lower berths being arranged on each side of the aisle with singles above. The power plants will be farther removed from the cabin than in any previous Douglas model and this should aid in noise reduction.

The following figures for the new machine and the D.C.3 are enlightening:—

	D.C.4.	D.C.3.
No. of passengers	40	21
Crew	5	3
Span	138 ft. 3 in.	95 ft. 0 in.
Length	97 ft. 0 in.	64 ft. 5 in.
Height	24 ft. 4 in.	17 ft. 6 in.
Engines	Four at 1,250 h.p.	Two at 1,100 h.p.
Cruising range	2,200 miles	1,800 miles
Top speed	237 m.p.h.	216 m.p.h.
Gross weight	60,000 lb.	24,000 lb.
Absolute ceiling	24,000 ft.	24,000 ft.
Service ceiling	22,900 ft.	21,800 ft.
Flight on two engines at... ...	7,700 ft.	On one at 8,200 ft.
Useful load	20,600 lb.	8,294 lb.
Mail, express, baggage	6,500 lb.	3,450 lb.
Landing speed	68½ m.p.h.	64 m.p.h.

Commercial Aviation

Swissair's Loss

IT is with personal regret that we record the death, in a tragic climbing accident in the Styrian Alps, of Walter Mittelholzer, director and air superintendent of the Swissair Company.

Best known to the general public for his exploits in flying over Africa and elsewhere—described in his book *Flying Adventures*—Herr Mittelholzer's work in developing the navigational equipment, and training the pilots of Swissair is such that he has in this company the finest possible memorial. Last year we had the opportunity of being shown round the workshops of Swissair at Zurich and later of being flown back to London by him, and realised then what a great champion he was of the modern scientific technique of transport flying. That his work has not been wasted is shown by the fact that Swissair is second to no air transport company in the matter either of equipment or of reliability.

Starting his flying career with the Swiss Air Force at the age of 21 in 1914, Herr Mittelholzer's enthusiasm had grown rather than been dimmed by the years and at the age of 43 he probably knew more of the technique of transport flying than any other pilot. Not satisfied merely to teach, he regularly flew on the company's services and was well known at Croydon. It is significant that his home lay on a hillside within a very short distance of Dubendorf Aerodrome, Zurich, and that from this home he could watch the aerodrome.

Mersey Ferry

SOME time ago we mentioned that an air ferry service was shortly to be started between Hooton and Speke. Operations actually began on Friday of last week when various notabilities from the Cheshire side made the first crossing in a Monospar S.T.25.

The operating company is Utility Airways, of Hooton Park, and the directors are Mr. and Mrs. Davison, who also operate the aerodrome. Mrs. Davison, who has had considerable flying experience, is the chief pilot of the company. Fares have been fixed at 6s. and 10s. respectively, for the single and return journeys, and, in addition to the scheduled services, a machine will always be available for "on demand" flights of the same character.

Lowe-Wylde Fund

IT will be recollected that *Flight* some weeks ago gave details of the closing of the Lowe-Wylde Memorial Fund. Since the fund closed several further subscriptions have been sent to Mr. E. C. Gordon England (of the London Air Park, Feltham), who states how much he has appreciated receiving them. He adds that if any other people feel they would like to contribute it is not too late to do so; the whole of the surplus realised is immediately invested at 3 per cent. compound interest for the ultimate benefit of the three orphan children of Mr. C. H. Lowe-Wylde.

Empire Air Day Preliminary

HELD in aid of the R.A.F. Benevolent Fund and by way of replacing an Empire Air Day, Scottish Aviation held a Coronation Air Display at Prestwick last Saturday. Four R.A.F. squadrons took part, as well as the School's fleet of Tigers, and the appearance of some 5,000 people in the stands—apart from those who lined the hedgerows—suggests that such displays, when well and truly carried out, can still attract the multitude.

Most impressive of the events were the formation drill by twelve Tigers and the dive-bombing by three Hawker Hinds from No. 602 Squadron. Incidentally, the stannic chloride from the practice bombs caused some discomfort to the roadside spectators—for whom, as non-paying guests, one can feel little sympathy.

Expansion at Wolverhampton

CONTINUED demands on the company's manufacturing resources have necessitated a considerable increase of floor space at the new Boulton Paul Aircraft factory at Wolverhampton, and contracts have been placed for extensions which will increase the size of the works by eighty per cent.

The new factory, to which the company's business was transferred from Norwich last August, is already working to capacity, despite the generous reserve space provided at the time it was designed. Its layout is planned on most progressive lines, and the extension will be constructed in parallel with the existing plant, so that the orderly flow of work through the various sections will not be disturbed.

Wakefield Aeronautical Engineering Scholarship

THE qualifying examinations for the two Wakefield Scholarships in automobile and aeronautical engineering (of a total value of £500, presented annually by Viscount Wakefield), will be held at the Colleges of Automobile and Aeronautical Engineering on May 27 and 28.

Successful candidates will be admitted to the Colleges at the term commencing October 5 and 6.

Particulars may be obtained from the Secretary, The Colleges of Automobile and Aeronautical Engineering, Chelsea, London, S.W.3.

Full House

WALKING through the De Havilland paint shop last week we saw, among other machines, two Dragonflies for delivery to the Danish Air Force, one of three Dragons for the Portuguese Air Force, two Rapides for internal services in Latvia, two more Rapides for the Latvian Air Force, a training Dragonfly for the Swedish Air Force, and a Hornet for a French journalist. The Dragons, incidentally, were specially ordered; this type is no longer made in the ordinary course of events, and these three will probably be the last of this famous type to leave the works.

Of British orders there were also two of a big batch of training Tigers, a flapped Rapide for Personal Airways, and Allied Airways' 86B for the North Sea service.

Stinson Radio

IN the article published last week dealing with the latest Reliant, Lear radio was mentioned as being a part of the special equipment for two private owners. Actually, the radio details consisted of R.C.A. receiving and D/F equipment in addition to the Lear radio compass.

Forthcoming Events

May 17-23. Derbyshire and Lancashire Gliding Club Training camp, Great Hucklow.
May 26-June 6. Brussels Aero Show.
May 26-30. Austrian Aero Club: Salzburg Gliding Contest.
May 27. R.Ae.S. Wilbur Wright Lecture: "Turbulence," by Dr. Theodor von Karman. Science Museum, South Kensington.
May 29. Empire Air Day.
May 29-31. London-Isle of Man Race and Round-the-Island Contests.
June 4-6. York and Leeming Club: International Meeting, York.
June 11-14. Hungarian Aero Club: International Conference.
June 12. Bristol and Wessex Aeroplane Club: Garden Party, Whitchurch.
June 15-20. Magyar Pilota Picnic, Hungary.
June 20. R.Ae.C. of Belgium: Gordon Bennett Balloon Race, Brussels.
June 21-28. Federation Aeronautique Internationale: London Conference.
June 26. Royal Air Force Display, Hendon.
June 28 and 29. S.B.A.C. Display, Hatfield.
July 1. Aero Golfing Society: *Flight* Trophy.
July 3. Newcastle-on-Tyne Aero Club: London-Newcastle Race.
July 3. Ramsgate Airport, Official Opening.
July 4-18. Aero Club of Germany: Wasserkuppe Gliding Meeting.
July 10. Cardiff Aeroplane Club: London-Cardiff Race.
July 11. Herts and Essex Aeroplane Club: Air Display, Broxbourne.
July 11. Italian Aero Club: Circuit of Rome.
July 15. Aero Golfing Society: Jubilee Cup.
July 17. Portsmouth Aero Club: Garden Party.
July 23-August 1. Swiss International Meeting.
July 24. Devon Air Day and Race: Plymouth and Exeter.
July 30-August 15. "Avia" Aero Exhibition, the Hague.
July 31. Cinque Ports Flying Club: Folkestone Aero Trophy Race.
July 31-August 2. Yorkshire Gliding Club: Opening Meeting Sutton Bank.
August 1-14. Yorkshire Gliding Club: Instructional Camp, Sutton Bank.
August 1-31. New York-Paris Air Race Flights.
August 3-September 7. Public Schools Aviation Camp, Norwich.
August 6-7. Austrian Aero Club: International Rally, Lake Worth.
August 14-22. Yorkshire Gliding Club: Open Contest, Sutton Bank.

R.-R.'s LATEST

The Kestrel and Merlin : Some New Facts About Two Famous Liquid-cooled Units : A Historical Comparison

Two recent Merlin installations : above, in the Hawker P.4/34 light bomber, and, on the right, the Fairey to the same specification. Both radiators have a flap to suit cooling to varying flight conditions. (*Flight* photographs)

THIS being a period of recollection the results of a comparison recently made by Rolls-Royce between the Eagle I—the first Rolls-Royce engine to go into large-scale production—and one of their modern Kestrel series (concerning which the latest information is given hereafter) is of special interest.

The Kestrel X has been chosen because, like the Eagle, it is rated at full throttle at sea level, precluding the complications introduced into a direct comparison by supercharging.

The power output per unit of cylinder capacity has increased by 20 per cent., the b.m.e.p. by 59 per cent., the specific weight has been reduced by 52 per cent. and the fuel consumption by 33 per cent. In spite of these advances, the normal running life between overhauls is 500 hours, compared with the 60 hours obtainable in 1915, indicating that the large increase in performance has been combined with corresponding gains in reliability. These improvements, of course, have been made possible by all-round development and improved materials and fuels.

Comparison between the Eagle I and a modern Kestrel supercharged type like the XVI, which gives 745 h.p. at 14,500ft., would show an even more striking contrast.

Composite Cooling

All the Kestrel engines with exception of the unsupercharged models are cleared for operation with two-position variable-pitch airscrews and have been tested for composite cooling, which implies that the system may be operated right up to its boiling point under a slight degree of pressure which permits the use of a smaller radiator than would be possible with a normal system of water cooling. Since the radiator is inadequate to dissipate all the heat generated on the climb a slight degree of boiling occurs, but in level flight the engine operates as a straightforward water-cooled unit. By locating the radiator in a special cowl having an adjustable flap at its exit, the cooling can be controlled and the radiator drag at high speed reduced. Composite cooling, therefore, reduces the direct drag due to the size of the radiator and also the interference drag.

All the Kestrel engines have completed the supplementary test for running at economical cruising consumption and for dive-bombing at speeds in excess of the maximum r.p.m. The main performance data relating to the current Kestrel series, which are available with a wide range of standard accessories, are given in the accompanying table.

Some additional information on the Merlin has lately been released. This engine has a bore and stroke of 5.4in. and 6in. respectively, giving a total cylinder capacity of 1,647 cu. in., or 27 litres. This engine has been designed for high-temperature liquid cooling, using ethylene glycol as the cooling medium. The international rated power is 990 h.p. at 12,000ft., the maximum output being 1,050 h.p. on standard Service fuel of 87 octane number. The nett dry weight is 1,318.5 lb.

In addition to intensive engine development the Rolls-Royce Company has concentrated recently on the development of engine installations possessing the combined advantages of reliability, low drag and minimum weight. To these ends the engine mounting has been arranged to permit the radiator being carried close to the crank case, and by mounting the header tank round the nose of the reduction gear the amount of piping in the system has been reduced to a minimum. Advantage of recent research in the reduction of cooling drag has been taken by enclosing the radiator in a low-drag cowl in which the cooling is done by air at relatively low velocity. The flow of cooling air is controlled to suit various flight conditions by an adjustable flap at the exit from the cowl. A great deal of work has also been done on exhaust systems and a type has now been evolved which combines good noise- and flame-damping properties with low weight and head resistance.

The investigation of the complex problems affecting power plants is carried out by Rolls-Royce s special experimental flight section, where all manner of questions are explored and teething troubles overcome. Valuable work in connection with the initial proof tests of new engines, the development of low-drag cooling systems, efficient exhaust systems and flight problems associated with the use of variable-pitch airscrews has already been done. It is thus possible to make recommendations based on practical results to aircraft contractors requiring information on power plant layout.

THE ROLLS-ROYCE KESTREL ENGINES.

Type.	Series.	International Rating.			Maximum Rating.			Rated Boost. lb. sq. in.	Maximum Take-off.			Continuous Cruising.		Oil Cons. pts. hr.	Nett Dry Weight. lb.	Octane Rating Fuel.
		r.p.m.	h.p.	Alt.	r.p.m.	h.p.	Alt.		r.p.m.	h.p.	Boost.	Max. r.p.m.	Max. Boost. lb. sq. in.			
S.	IV-VI VP.	2,750	630	13,000	2,900	640	14,000	+1.5	2,750	700	+6	2,500	+½	4-8	985	87
MS.	VII-IX VP.	2,750	715	4,250	2,900	730	5,250	+2.625	2,750	800	F.T.	2,500	+1¼	4-8	985	87
S.	X-XII	2,500	585	S.L.	2,900	630	S.L.	—	2,500	585	F.T.	2,500	—	3-6	885	87
S.	XIV-XVI VP.	2,750	715	12,250	3,000	745	14,500	+3.25	2,750	745	+6	2,600	+2¼	4-10	985	87

ITALY'S HEIGHT RECORD

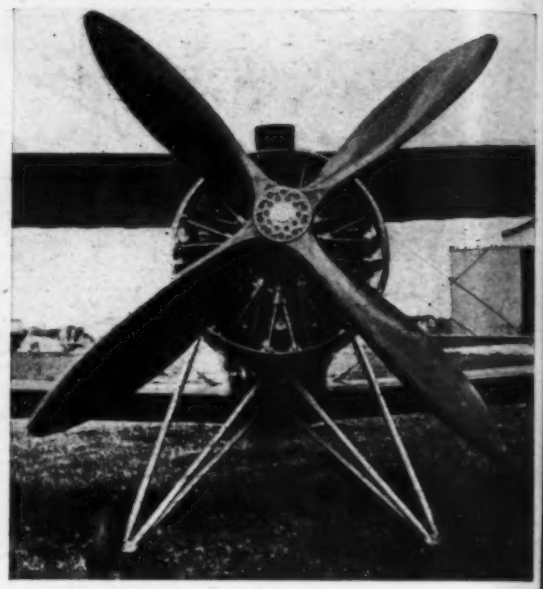
Caproni 161 with Two-row Piaggio Reaches 51,348 ft.

ITALY'S recapture of the altitude record proves once again the worth of the method used by that country of training pilots in special schools for special purposes. The world's speed record, still unbeaten, was established at the school in Desenzano, where regular high-speed experiments and classes are held each year. The long-distance navigation school at Orbetello proved equally successful by organising the two mass flights of Marshal Balbo and his squadron across the South and North Atlantic. For the most part the credit for breaking the world's altitude record is due to the high-altitude school at Guidonia.

The new world's height record of 51,348ft. was established on May 7 by Lt.-Col. Mario Pezzi, who commands the Guidonia school, on a Caproni 161 single-engined biplane powered by a Piaggio P.XI R.C.72 fourteen-cylinder double-row radial. The previous record held by Sqn. Ldr. Swain in the Bristol 138 monoplane has thus been beaten by 1,417ft.

In the Caproni 161, the cockpit is open, but the pilot wears a special airtight electrically heated suit made of rubber and fabric, reinforced with light alloy sheets. His head is enclosed in a large light-alloy cylinder with heated glass windows.

The 161 is derived from the Caproni 113 which held the world's altitude record previous to Sqn. Ldr. Swain's effort on the Bristol. The biplane arrangement was chosen because of its light structure weight. It is claimed that the machine has a safety factor of well over six, can perform aerobatics and fly inverted. The fuselage and tail unit are of steel tubular construction, but the wings are of wood, the whole machine being fabric covered. The Piaggio XI R.C.72 delivers 710 h.p. at 23,600ft., and 140 h.p. at 46,000ft. It is fitted with a down-draught carburettor and automatic mixture control. For the record attempt the compression ratio was increased so that the theoretical power at ground level was more than 1,800 h.p.



The Piaggio two-row radial of the Caproni 161 drives this enormous four-bladed airscrew.

Rolls-Bristol Airscrew Co-operation

ROTOL AIRSCREWS, LTD., is the title of a company just formed, with a capital of £250,000, for developing and manufacturing variable-pitch airscrews. The word "Rotol" conceals the identity of two famous aviation companies, being compounded of the first syllable of the name of one of the companies and the last syllable of the name of the other. The firms are Rolls-Royce, Ltd., and the Bristol Aeroplane Co., Ltd., and the capital has been subscribed jointly and equally by them.

It will be recalled that in *Flight* of May 9, 1935, in a series of articles on variable-pitch airscrews, were described and illustrated the Bristol and Rolls-Royce versions of the Gloster Hele-Shaw Beacham v.p. airscrew, these two firms having taken over from the Gloster Aircraft Co., Ltd., the development which had previously been carried out at the Gloster works at Hucclecote.

It is to be presumed that Bristols and Rolls-Royce have found that while v.p. airscrew development was a mere side-line in both firms progress was not as rapid as it should have been, and the formation of the new company, to specialise on this work, should ensure the pooling of the results obtained up till now and the concentration on further development.

The Merrill Atlantic Ferry

DICK MERRILL'S double Atlantic flight last week seemed all the more meritorious by reason of the absence of any undue fuss or trumpet-blowing. Merrill, with his companion, Jack Lambie, went about the job in a quiet, businesslike way, as befits the good airline pilot he is. He brought his Lockheed Electra (two 450 h.p. P. and W Wasps) across to pick up Coronation films and take them back to the States with all haste. Apparently there was some sort of hitch in the arrangements—the flying of the films from London to Southport Sands, where the Electra awaited them, was held up by early-morning fog, and the rising of the tide caused further delay—but Merrill could hardly be blamed.

As for facts and figures, the achievement is perhaps chiefly notable for the fact that this is the first time a two-way Atlantic flight has been made with so short a time separating the two journeys.

Coming east, they left Floyd Bennett Field, New York, at 9.35 p.m. B.S.T. on Sunday, May 9, and arrived at Croydon (after a small miscalculation which landed them at North Weald R.A.F. Station) at 6.40 p.m. on the Monday, having thus taken 21 hours. They had averaged about 160 m.p.h.

On the way back, they left Southport at 9.13 p.m. on Thursday, and reached Newfoundland in under 16 hours (thus easily beating Merrill's own 18hr. 44min. record). Fog then delayed them, and, after a landing at Quincy, near Boston, Merrill completed his fourth Atlantic flight at Floyd Bennett Field at 9.35 p.m. B.S.T.

The Electra's equipment included a Sperry automatic pilot (which Merrill described as "worth its weight in gold") and Stanavo fuel (100-octane for take-off) and oil were used.

British Marine : New Board Elected

AT a meeting of British Marine Aircraft, Ltd. (in voluntary liquidation), held last week, resolutions were passed which approved of the proposed linking up of B.M.A. with the Folland group and the appointment of Captain J. Dawson Paul and Mr. H. P. Folland as directors, in addition to Messrs. A. P. Good, A. C. Kimpton and E. L. Granville, M.P.

Mr. A. P. Good, a member of the shareholders' committee, explained that all the directors of the old company had, in the interests of the company, handed in their resignations to the liquidator, Mr. F. L. Sharles. The promised co-operation of Mr. G. H. Handasyde and Mr. W. H. Mace would ensure continuity of management, and Air Marshal Sir John Higgins had intimated his willingness to join the board.

The proposed co-operation of British Marine Aircraft and the Folland group, coupled with the new board of directors, should result in a company with considerable possibilities. The factory at Hamble is regarded as one of the finest in the country, and the equipment is, thanks largely to the efforts of Mr. Craven-Ellis, one of the retiring directors, particularly up to date and complete. Mr. Handasyde and Mr. Mace both have very long experience of aircraft construction, while Sir John Higgins has had long association not only with the aircraft industry (in the Armstrong Whitworth group) but with the Air Ministry, where for several years he was Air Member for Supply and Research. Captain J. Dawson Paul was a director of Boulton and Paul for many years, and Mr. H. P. Folland has been actively engaged on aircraft design since the early days of the War, first at the Royal Aircraft Factory, next as chief designer to the British Nieuport company, then, and until recently, as chief designer to the Gloster Aircraft Co., Ltd.

SAFETY FIRST

The Scheldemusch Pusher to be Made in this Country : Interesting Flying Characteristics : "Tricycle" Undercarriage

ALTHOUGH the machine itself is extremely interesting as an example of the result of a very serious attempt to produce an aircraft which can be flown with safety by almost any pilot—or even a non-pilot—the most interesting feature of the Dutch Scheldemusch is its undercarriage. From time to time the three-wheeled undercarriage has made its appearance, the most recent examples being those of the various U.S. Bureau of Air Commerce machines, the Cowey-Eugster and that to be fitted to the Douglas D.C.4. In each case the reasons and effects are slightly different, but in the first two they are primarily those of simplifying the landing business for the novice pilot.

The idea of making contact with the ground necessarily at an angle of maximum lift has always appeared to be somewhat illogical, particularly where low stalling speeds are concerned, and any machine which has been designed for the absolute novice should necessarily be arranged so that a good many liberties may be taken with it near the ground. In the case of the Scheldemusch, or Scheldt Sparrow, the centre of gravity is ahead of the main undercarriage, and the elevator control has been limited so that it is virtually impossible to make an incorrect landing unless the machine is brought in at an unreasonably high speed.

If a semi-three-point landing is attempted the machine merely pivots on to its nose as soon as the ground has been touched, while if the machine is glided slowly into the ground it continues in a horizontal direction and does not "balloon" up again. The Scheldemusch undercarriage has a vertical movement of nearly six inches and is capable of taking a considerable vertical stress; its front wheel is steerable, so that the machine is as manœuvrable on the ground as one could possibly wish.

Basically, the Scheldemusch is a very normal pusher biplane with a pronounced dihedral, H.P. slots, differential ailerons, and a boom tail. The single-seater fuselage—or, as it used to be termed, nacelle—is of welded steel tube construction, while the wings are two-spar wooden structures. In these days of low-powered machines it may be considered as powerful for a single-seater, the engine being a flat-twin Praga B. of 40 h.p. For some reason or other the noise of the engine is more pronounced in the cabin than it should be, and from the pilot's point of view this is the only criticism I have to make. The view in the forward hemisphere is extremely good, since, in level attitude, the top of the scuttle is very well below the horizon.

The Scheldemusch about to adopt one of the unconventional attitudes which it can assume quite near the ground with equanimity. The Handley Page slots are just beginning to open. (*Flight* photograph.)

The Take-off

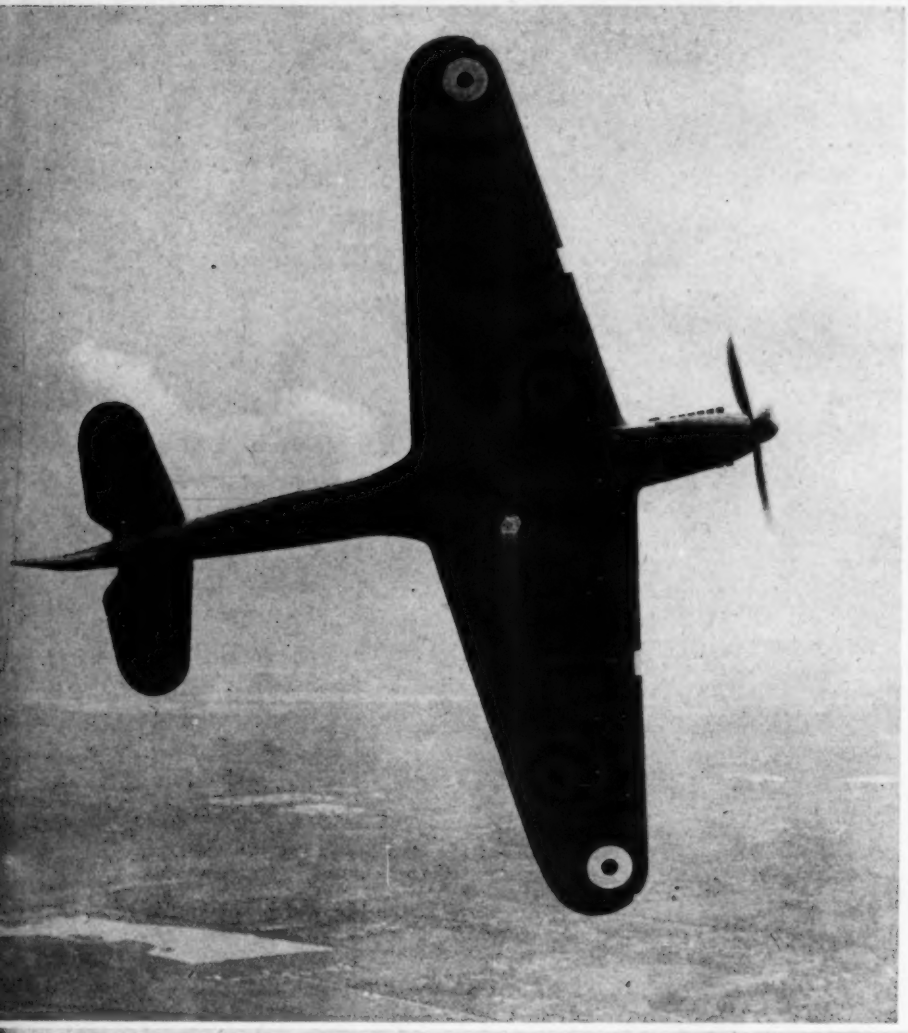
With the centre of gravity so far forward it might be expected that the take-off would be interesting. In fact, it is not possible to leave the ground until the speed is quite high, and the machine then climbs very strongly indeed. To the pilot it first appears as if nothing in the world will make it leave *terra firma*, and then, quite suddenly, with the stick held only a little aft of neutral, the nose lifts and the machine leaves the ground in quite a steep climb.

The fact that there is no fuselage means that the Schelde-

(*Continued after centre page illustrations.*)

On all threes : The pusher on the ground, showing the 40 h.p. Praga-flat twin engine. (*Flight* photograph.)

THE ESSENCE of ELEGANCE

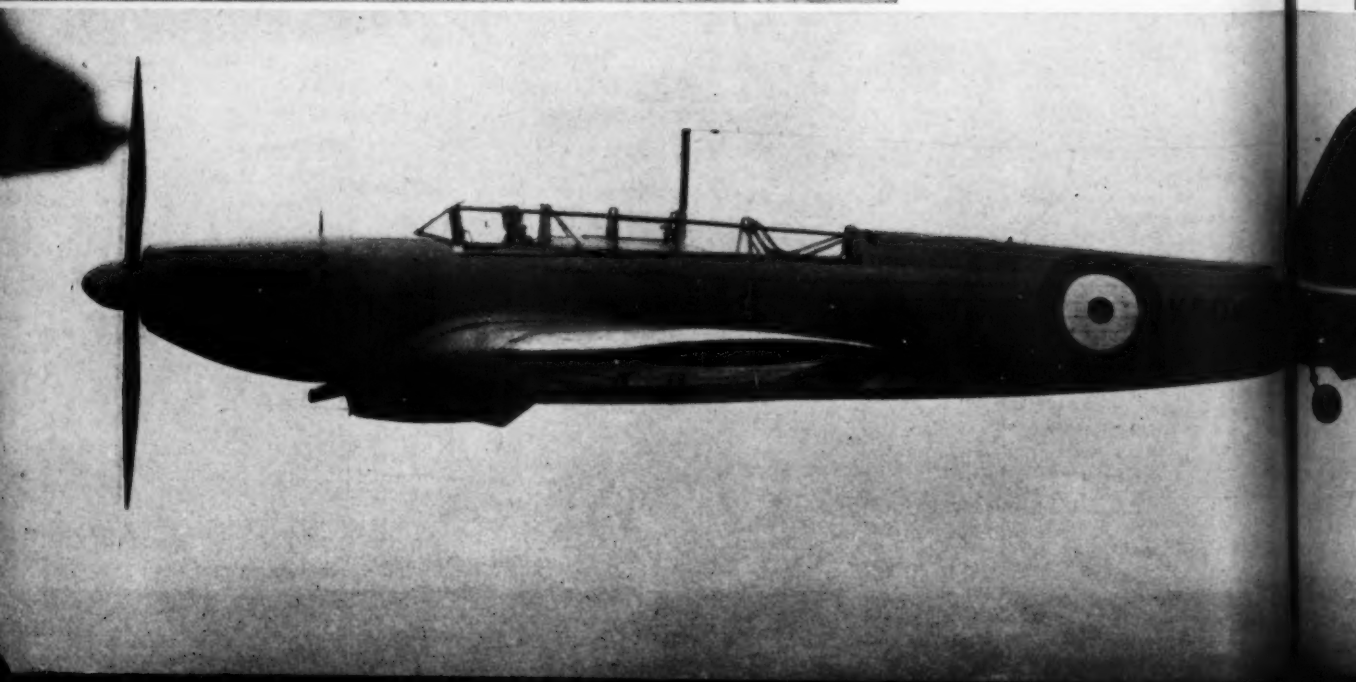


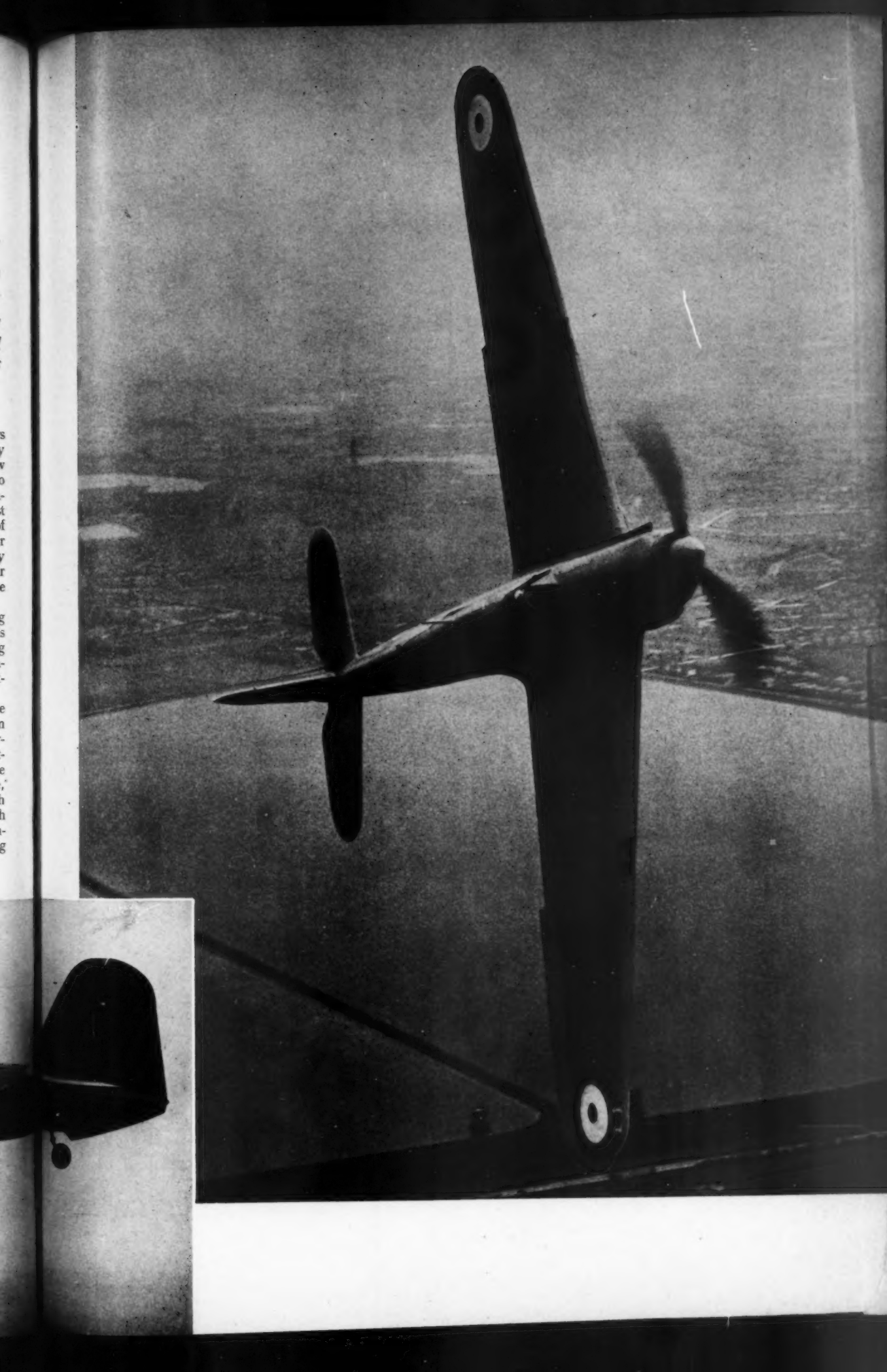
Pictorial Results of Co-operation Between Flt. Lt. Christopher Staniland, in the Fairey P.4/34, and Flight's Chief Photographer

IN the Fox of eleven years ago the Fairey company showed the world just how efficient it was possible to make a two-seater bomber, incorporating all the newest aerodynamic improvements of the period. Now, in their P.4/34 light bomber, they have produced a machine for similar duties which may be something like twice as fast.

This set of outstanding *Flight* photographs reveals many of the features making for the superlative performance of this, our newest experimental bomber.

The engine is a Rolls-Royce Merlin of over 1,000 maximum horse-power; the undercarriage is completely retractable; the airscrew is a De Havilland variable-pitch type, permitting, in conjunction with the trailing-edge flaps, a high wing loading. The smoothness of the fuselage and wing covering is quite remarkable.





THE SCHELDEMUSCH PUSHER BIPLANE
40 h.p. Praga B. Engine

Span	22ft. (6.7 *m.*)
Length	17ft. (5.2 *m.*)
Height	8ft. (2.5 *m.*)
All-up weight	660 lb. (300 *kg.*)
Disposable load	220 lb. (100 *kg.*)
Maximum speed	85 m.p.h. (136 *km.h.*)
Cruising speed	70 m.p.h. (112 *km.h.*)
Stalling speed	37 m.p.h. (50 *km.h.*)
Rate of climb	500 ft./min. (2.5 *m./secs.*)
Range	220 miles (350 *kms.*)
Landing and take-off run	75 yds. (about)
Makers	Aircraft Constructions, Ltd., Sidcup, Kent

musch turns almost exclusively on the rudder, and the stick is used merely to keep up the nose. Extraordinarily steep turns can, in fact, be made without touching the stick, and it was interesting to discover that the machine would sideslip to a useful extent, though the speed could not be kept well down in this manœuvre. However, it is not a very clean machine and any excessive speed is lost as soon as the nose is raised. For this reason the approach should be a very simple matter to the uninitiated; one simply points the machine at the part of the aerodrome where the landing is to be made and levels off, very roughly and in the old-fashioned manner, when the blades of grass can be distinguished. If the hold-off is made high the machine simply sinks into the ground and stays there, and if it is not made at all the results appear to be equally undisturbing.

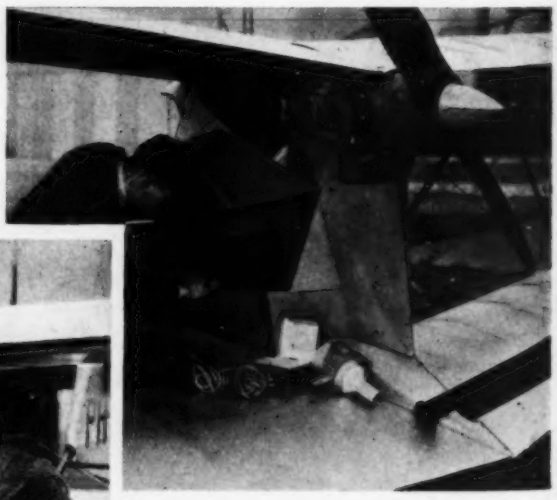
Demonstration Extraordinary

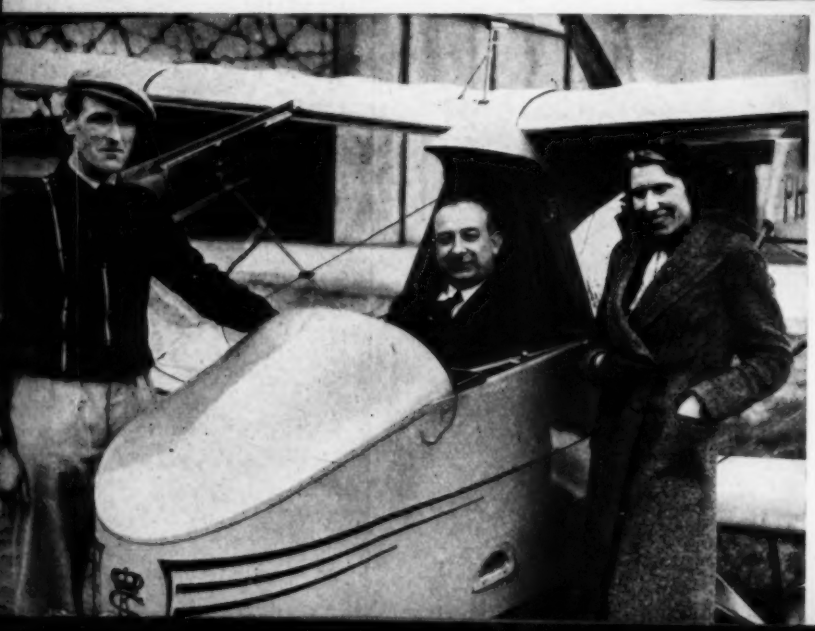
Mr. T. E. Slot, the designer, has a very remarkable repertoire of demonstration tricks near the ground which adequately show that the machine—at least with the engine working and in the hands of a pilot who knows it well—can be pushed about the air in a manner which is quite terrifying to the uninitiated. After watching one of these demonstrations I elected to do much the same sort of thing, but at a safe height of 1,500ft. When stalled as far as possible, engine on or off, the nose merely rises and falls against the horizon, and aileron control, though weak, remains there all the time. Within the inevitable reason, the Scheldemusch is foolproof. Probably if a pilot had the temerity to dive it steeply and then pull it up equally violently with full rudder one way or another it could be forced into something resembling a spin—though this, I was told, is merely a controllably steep spiral.

The position of the pitot head just above the centre-section in the demonstration machine was not conducive to accuracy, and the readings below 100 km.h. were certainly far from correct. The official figures are given in the table on this page. Three minutes' flying without noticeable loss of height on the metric altimeter and at an engine speed of 2,200 r.p.m. showed an A.S.I. reading of about 110 km.h. (68.5 m.p.h.). The machine, in any case, is designed for safe rather than for fast flying.

"Getatability": The nose of the Scheldemusch's nacelle is quickly removable to give access to the instruments and controls. (*Flight* photograph.)

Arrangements have been made for the manufacture and sale of the Scheldemusch in this country by Aircraft Constructions, Ltd., of Sidcup, Kent, and the price over here will be in the region of £300. The manufacturers, N. V. Koninklyke Maatschappy "De Schelde," produce a miniature flying-boat which might interest a few owners. Perhaps in due course we shall see that. H. A. T.





(Above) The baggage bag—a rather surprising piece of accommodation disclosed by the opening of a panel in the Scheldemusch.
(Left) Mr. T. E. Slot, the designer, in the cockpit of the Scheldemusch. On the left is Mr. R. G. Doig, managing director of Aircraft Constructions, Ltd., who are to build the machine in this country. On the right is his business partner, Miss I. Robins. (*Flight* photographs.)

THE ROYAL AIR FORCE

SERVICE NOTES AND NEWS — AIR MINISTRY ANNOUNCEMENTS

FORMATION OF No. 233 (GENERAL RECONNAISSANCE) SQUADRON

No. 233 (General Reconnaissance) Squadron has now formed at Filton and will move to Tangmere on June 20.

C.F.S. 25th ANNIVERSARY DINNER

To mark the occasion of the 25th anniversary of the formation of the Central Flying School, R.A.F., a reunion dinner for officers on the strength of the C.F.S. before and during the war, and on the Staff since that period, will be held at the May Fair Hotel, Berkeley Square, London, W.1, on Friday, June 18, 1937. Particulars may be obtained from the Honorary Secretary, Central Flying School Reunion Dinner, Central Flying School, Royal Air Force, Upavon, Marlborough, Wilts.

EX-APPRENTICES HOLIDAY TOUR

It has been suggested by a number of ex-Aircraft Apprentices that a summer holiday Continental tour should be organised for ex-Apprentices, to be run on the lines of the annual Halton Belgium Tours, but on a rather more ambitious scale. An experimental tour of this nature is being planned for this year, and will be organised provided sufficient support is forthcoming. The dates will be August 4 to August 15, 16 or 17, and the places visited will probably include Brussels, Cologne, a trip on the Rhine, Heidelberg, Nuremburg, Munich and the Bavarian Alps, with a possible extension into Austria. The party will be limited to ex-Apprentices (and the past or present staffs of the Apprentice Training Schools), with the exception that an ex-Apprentice may invite one friend—preferably a member of the Royal Air Force.

The tour will be open to ex-Apprentices of any rank, but not to the present Apprentices, for whom the annual Belgium Tour is being run as usual. Anyone interested should communicate at once with Mr. A. C. Kermode, Purwell Mill House, Hitchin, Herts.

SALONIKA ARMY AND BLACK SEA FORCES

The Coronation Year Dinner of the Salonika Army and Black Sea Forces will take place on Ascot-week Friday, June 18, at the Café Royal, 68, Regent Street, London, W.1, at 7.15 for 8 p.m.

Tickets (exclusive of wines, but including gratuities) are 14s. 6d. each, and may be obtained from the hon. secretary of the dinner, Major Elliot Bell, 68, Regent Street, London, W.1 (Regent 8240).

Field Marshal Lord Milne, G.C.B., will preside as usual. It is particularly hoped that a strong R.F.C. and R.A.F. table will be formed; Flt. Lt. R. C. Preston, A.F.C., Woburn, Bletchley, Bucks, is the member of the committee representing these Forces, and he will be interested to hear from all intending diners.

ROYAL AIR FORCE GAZETTE

London Gazette, May 11, 1937

General Duties Branch

Flt. Lt. P. F. Canning is granted a permanent commission in that rank (April 20).

The following Acting Pilot Officers on probation are confirmed in their appointments and graded as Pilot Officers on the dates stated:—P. H. G. Beazley, T. H. Stockdale (January 6); R. S. Blake (April 24).

The following Flying Officers are promoted to the rank of Flight Lieutenant on the dates stated:—J. F. H. du Boulay (April 1); J. W. Buchanan, P. N. J. Wilkins, J. C. Evans, G. N. Amison, G. R. Howie (April 23); I. W. Braye (May 12).

The following Pilot Officers are promoted to the rank of Flying Officer on the date stated:—R. H. Spencer (seniority June 3, 1936) (September 3, 1936); R. G. Forshaw (March 14); E. W. Martin (March 21).

Wing Cdr. J. C. Slessor, M.C., is placed on the half-pay list, Scale B, from April 19 to 30 inclusive; Sqn. Ldr. D. S. Earp, D.F.C., is placed on the retired list at his own request (May 5); Flt. Lt. E. R. Berry is transferred to the Equipment Branch on probation (April 19); the short service commission of Acting Pilot Officer on probation E. T. Watson is terminated on cessation of duty (April 30).

Equipment Branch

Pilot Officer on probation N. V. Lindemere is confirmed in his appointment and promoted to the rank of Flying Officer (January 6); F/O. G. A. Durnford is placed on the retired list on account of ill-health (May 8).

Medical Branch

The following Flight Lieutenants are promoted to the rank of Squadron Leader on the dates stated:—R. E. Alderson, M.B., B.S., D.M.R.E. (May 1); J. Kemp, M.B., Ch.B., D.P.H. (May 2).

Commissioned Engineer Officers

The following Flying Officers on probation are confirmed in their appointments on the dates stated:—J. C. Steadman (April 14); C. T. McKnight (April 22).

Commissioned Signals Officers

The following Flying Officers on probation are confirmed in their appointments on the dates stated:—F. W. G. Aggett (March 18); A. W. Coe (April 16).

Memorandum

The permission granted to P. A. H. de Metz to retain the rank of Lieutenant is withdrawn with effect from April 2.

ROYAL AIR FORCE RESERVE

Reserve of Air Force Officers

General Duties Branch

A. G. Hill is granted a commission as Flying Officer in Class A with effect from May 4 and with seniority of May 3, 1928.

The following are granted commissions as Flight Lieutenants in Class C on the dates stated:—Capt. H. T. O. Windsor, M.C. (April 5); Lt. G. Brenton-Coward, D.F.C. (November 23, 1936); Sec. Lt. A. H. C. Derby (January 4).

F/O. J. Hall is transferred from Class A to Class C (March 4); F/O. J. G. Butt-Reed is transferred from Class C to Class A (May 8); F/O. J. F. Truscott relinquishes his commission on completion of service (March 18); the notification in the *Gazette* of April 21, 1936, concerning F/O. J. T. Hall is cancelled.

AUXILIARY AIR FORCE

General Duties Branch

No. 601 (County of London) (Fighter) Squadron.—C. P. Green is granted a commission as Pilot Officer (March 26).

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

General Duties Branch

Air Vice-Marshal.—H. M. Cave-Browne-Cave, C.B., D.S.O., D.F.C., to Headquarters, No. 16 (Reconnaissance) Group, Lee-on-the-Solent; on appointment as Air Officer Commanding, 27.4.37.

Wing Commanders.—H. M. Probyn, D.S.O., to Headquarters, No. 12 (Fighter) Group, Uxbridge; for Air Staff duties, 26.4.37. P. Warburton, M.B.E., to Special Duty List, whilst employed with the Air Raid Precautions Department of the Home Office, 1.4.37. W. Elliott, D.F.C., to Special Duty List, for duty as Assistant Secretary (Air) to the Committee of Imperial Defence, 1.4.37. H. V. Drew, O.B.E., A.F.C., to No. 37 (Bomber) Squadron, Feltwell; to command, 26.4.37. S. L. G. Pope, D.F.C., A.F.C., to R.A.F. Station, Debden; to command, 21.4.37.

Squadron Leaders.—A. MacGregor, M.B.E., D.F.C., to R.A.F. Station, Abbotsinch; to command, 25.4.37. A. E. Paish, to No. 97 (Bomber) Squadron, Leconfield; for flying duties, 22.4.37. H. M. Whittle, to Headquarters, No. 2 (Bomber) Group, Andover; for Air Staff duties, 26.4.37. R. T. Taaffe, to No. 223 (Bomber) Squadron, Naironi; to command, 8.4.37.

Flying Officer.—S. G. Pritchard, to No. 7 Flying Training School, Peterborough, 26.4.37.

Acting Pilot Officers.—B. Brooke, to No. 30 (Bomber) Squadron, Dhibban, Iraq, 6.4.37. D. M. Doran, to No. 55 (Bomber) Squadron, Hinaidi, Iraq, 6.4.37. J. F. H. Booth, to No. 70 (Bomber Training) Squadron, Hinaidi, Iraq, 6.4.37. J. S. Dunlevie, to No. 84 (Bomber) Squadron, Shaibah, Iraq, 6.4.37.

The undermentioned are posted to the Units shown with effect from April 24, 1937:—

M. V. Baxter, C. G. H. Crusoe, to No. 1 (Fighter) Squadron, Tangmere. C. H. Ancil, P. H. M. S. Hunt, S. L. Ring, M. Wyatt, to No. 12 (Bomber) Squadron, Andover. R. G. Wheldon, to No. 18 (Bomber) Squadron, Upper Heyford. H. T. J. Anderson, M. L. ff. Beytagh, C. P. Igglesden, to No. 23 (Fighter) Squadron, Northolt. A. G. Griffin, A. E. Thompson, to No. 40 (Bomber) Squadron, Abingdon. N. W. Timmerman, D. White, to No. 49 (Bomber) Squadron, Worthy Down. A. W. A. Bayne, R. S. Blake, to No. 54 (Fighter) Squadron, Hornchurch. E. Holden, R. E. G. Morewood, to No. 56 (Fighter) Squadron, North Weald. M. J. Casey, C. T. Norman, to No. 57 (Bomber) Squadron, Upper Heyford. M. J. S. Newman, to No. 61 (Bomber) Squadron, Hemswell. C. L. G. Back, A. E. Hyde-Parker, to No. 63 (Bomber) Squadron, Upwood. E. W. Mitchell, to No. 79 (Fighter) Squadron, Biggin Hill. M. T. St. J. Pattle, to No. 80 (Fighter) Squadron, Henlow. J. D. D. Collier, K. C. Powell, to No. 83 (Bomber) Squadron, Turnhouse. J. R. M. Boothby, to No. 87 (Fighter) Squadron, Tangmere. P. Edwards, to No. 90 (Bomber) Squadron, Bicester. M. J. B. Young, to No. 98 (Bomber) Squadron, Hucknall. H. J. Lyon, E. J. Palmer, to No. 101 (Bomber) Squadron, Bicester. F. C. Griffiths, J. R. Havers, R. R. Helsby, to No. 103 (Bomber) Squadron, Usworth. E. A. Warfield, to No. 107 (Bomber) Squadron, Old Sarum. H. C. Tootal, to No. 108 (Bomber) Squadron, South Farnborough. R. G. Dutton, B. A. Mortimer, to No. 111 (Fighter) Squadron, Northolt. L. C. Mitchell, to No. 144 (Bomber) Squadron, Hemswell. H. E. Angell, A. J. Hudson, P. C. Rolls, to No. 207 (Bomber) Squadron, Worthy Down. R. F. Weatherill, to No. 213 (Fighter) Squadron, Northolt. K. F. Arnold, D. P. Bamber, S. E. Bussey, V. H. Furlong, A. H. McLaren, C. H. Milton, D. C. Pritchard, D. A. Robertson, to No. 217 (Bomber) Squadron, Boscombe Down. T. H. Clarke, J. G. P. Greenwood, R. H. Hain, to No. 220 (General Reconnaissance) Squadron, Bircham Newton. G. C. C. Bartlett, K. W. C. Bindloss, J. C. Burge, C. E. A. Garton, H. D. Green, J. G. H. Potter, M. G. Scott, R. G. M. Walker, to No. 224 (General Reconnaissance) Squadron, Boscombe Down. G. L. Malcomson, H. B. M. Pearson, C. D. W. Price, W. A. Sykes, to No. 269 (General Reconnaissance) Squadron, Abbotsinch.

Medical Branch

Squadron Leaders.—J. Hutchieson, to R.A.F. Station, Dhibban, Iraq; for duty as Senior Medical Officer, 1.4.37. G. W. Paton, to Aircraft Depot, Hinaidi, Iraq; for duty as Senior Medical Officer, 1.4.37.

Equipment Branch

Flight Lieutenant.—G. Matthews, to Headquarters, R.A.F., Far East, Singapore, Straits Settlements, 23.4.37.

Accountant Branch

Flight Lieutenants.—J. A. Stephenson, to R.A.F. Depot, Aboukir, Egypt, 14.4.37. H. D. Nicholson, to R.A.F. Station, Ismailia, Egypt, 17.4.37.

CORONATION HONOURS

MANY officers and men of the Royal Air Force, and several civilians whose services have been of benefit to civil or military aviation, figure in the list of honours conferred by His Majesty the King to mark the occasion of his Coronation. The names in question appear below.

BARON

Sir John Davenport Siddeley (Managing Director, Armstrong Siddeley Motors).

ORDER OF THE BATH

G.C.B.—Air Chief Marshal Sir John Steel, K.C.B., K.B.E., C.M.G.

K.C.B.—Air Marshal W. R. Freeman, C.B., D.S.O, M.C.

C.B.—A.V.-M. A. S. Barratt, C.M.G., M.C.; A.V.-M. E. L. Gossage, D.S.O., M.C.; Air Comdre. A. V. J. Richardson, O B.E., M.B., B.Ch., D.P.H., K.H.S.

C.B. (Civil Division).—Mr. D. R. Pye, M.A., Sc.D., M.I.Mech.E., Director of Scientific Research, Air Ministry.

ORDER OF THE BRITISH EMPIRE

K.B.E.—A.V.-M. A. W. Iredell, M.C., M.R.C.S., L.R.C.P., K.H.P

K.B.E. (Civil).—Mr. James Stirling Ross, C.B., C.B.E., Deputy Secretary, Air Ministry.

C.B.E.—Air Comdre. R. H. Verney, O.B.E.; Group Capt. J. W. Cordingley, O.B.E.; Group Capt. L. Auker, O.B.E.; Group Capt. C. G. Murray, O.B.E.; Wing Cdr. Donald F. Stevenson, D.S.O., M.C.; Wing Cdr. E. St. Clair Harnett, O.B.E.; the Rev. J. R. Walkey, M.A., K.H.C.; Group Capt. A. T. Cole, M.C., D.F.C., R.A.A.F.; Wing Cdr. T. M. Wilkes, M.C., A.D.C., Royal New Zealand Air Force, Director of Air Services and Controller of Civil Aviation, Dominion of New Zealand.

C.B.E. (Civil).—Mr. C. W. Reeve (Chairman and Managing Director of the Associated Equipment Co.), for services to the Air Ministry.

O.B.E.—Wing Cdr V. S. Brown; Wing Cdr. R. S. Aitken, M.C., A.F.C.; Wing Cdr. H. J. Roach, A.F.C.; Wing Cdr. H. S. P. Walmsley, M.C., D.F.C.; Wing Cdr. T. H. Evans; Wing Cdr. A. F. Rook, M.R.C.P., M.R.C.S., D.P.H.; Sqn. Ldr. A. J. Rankin, A.F.C.; Sqn. Ldr. F. Kirk; Sqn. Ldr. J. V. Mason; Sqn. Ldr. W. Bourne; Sqn. Ldr. G. J. W. Mackinolty, R.A.A.F.; Miss W. M. Coulthurst (Matron), Princess Mary's R.A.F. Nursing Service.

O.B.E. (Civil).—Mr. J. M. Stagg, D.Sc., Senior Technical Officer, Meteorological Office, Air Ministry.

M.B.E.—Flt. Lt. V. S. Sofiano; Flt. Lt. J. Patrick; Flt. Lt. C. Hanson-Abbott; Flt. Lt. R. E. Barnett; F/O. W. G. Swanborough; W/O. O. C. E. Buddin; W/O. F. Nightingirl; W/O. A. E. Sims, L.R.A.M., A.R.C.M.; W/O. F. Watson; W/O. H. F. Thomas; W/O. J. F. Smith; W/O. H. A. May; W/O. G. G. Meager.

M.B.E. (Civil).—Mr. H. J. Hutter, Civil Assistant and Accountant, Air Ministry; Flt. Lt. (Hon. Sqn. Ldr.) D. S. Jillings, M.C. (Ret.), Civilian Assistant, R.A.F.

ORDER OF THE INDIAN EMPIRE

C.I.E.—Group Capt. N. H. Bottomley, A.F.C., Officer Commanding No. 1 (Indian) Group, Royal Air Force, India.

ROYAL VICTORIAN ORDER

G.C.V.O.—A.V.-M. Sir Philip W. Game, G.B.E., K.C.B., K.C.M.G., D.S.O.

BRITISH EMPIRE MEDAL

Flt. Sgts. J. P. Scorgie, Harry Taylor, F. Hills, S. E. Birt, A. A. O. Lawson, H. Allsopp, Sgt. J. Beaton.

MILITARY MEDAL

L. A/C. J. L. Johnson.

ROYAL RED CROSS DECORATION (Second Class)

Miss M. E. R. Edwards (Matron), Princess Mary's R.A.F. Nursing Service.

ROYAL AIR FORCE AWARDS

Second Bar to the Air Force Cross.—Wing. Cdr. T. A. Langford-Sainsbury, D.F.C., A.F.C.

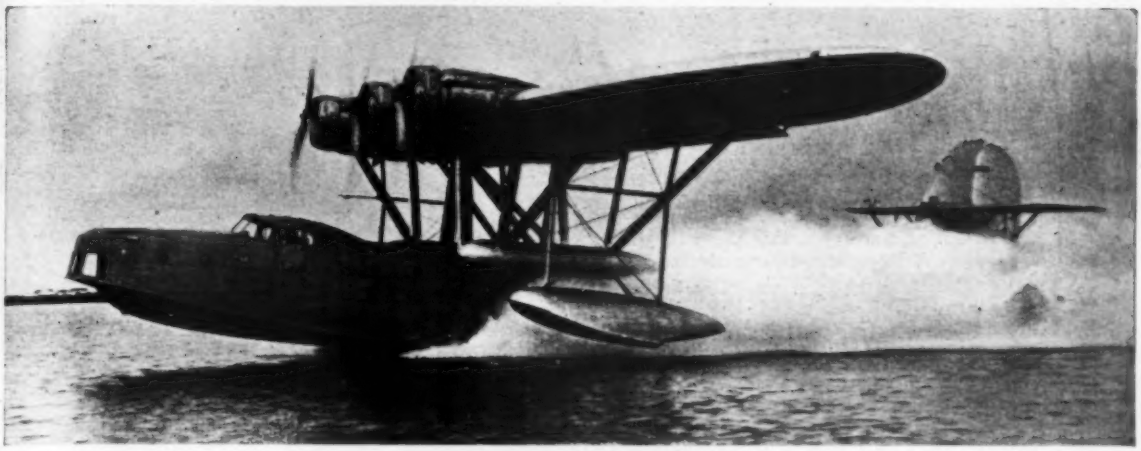
Bar to the Air Force Cross.—Sqn. Ldr. C. E. Horrex, A.F.C.

Air Force Cross.—Sqn. Ldr. R. S. Blucke; F/O. K. G. Stoddart; Flt. Lt. R. W. Reeve, D.F.C., M.M.; Sqn. Ldr. W. L. Runciman.

Air Force Medal.—Sgt. C. A. Deakin; Sgt. H. W. Gill.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS



A SERVICE machine flew over London early on Coronation Day to obtain pictures of the crowds, but was clear of the area before the procession started.

Six Vultees are in a hangar at Le Bourget. They may be used for a London-Paris service during the forthcoming exhibition in the latter capital.

M. René Paulhan, son of M. Louis Paulhan, the French aeronautical pioneer, was killed at Villacoublay last week while testing a new machine.

The King has approved the award of the Patron's Medal of the Royal Geographical Society to Mr. Lincoln Ellsworth for his work in developing the technique of aerial navigation in the Polar regions, culminating in his Antarctic flight of 1935-36.

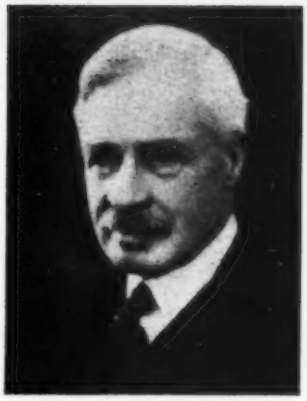
Portentous news item from the States: "The regular aerial duck-feeding service over New York and New Jersey has resulted in the birds weathering the winter better than ever before. Planes take up 500 lb. of corn, and pilots pierce a number of holes in the sack, which sends the vital food in all directions, thus making the bird's exercise for their rations and thereby keeping them in perfect health."

Twenty-five Years Ago

(From "Flight" of May 18, 1912.)

"A report from Berlin states that Count Zeppelin is interesting himself in an aeroplane factory which has been established by a former employee of his. It is probable that these new works will shortly be turning out a machine embodying Count Zeppelin's conception of an aeroplane."

BETWEEN CLOUD AND CROWD: Tiger Moths from the Reid and Sigrist School at Desford manœuvre at the Leicester Coronation Air Display. A report appears on pages 506 and 507. (*Flight* photograph.)



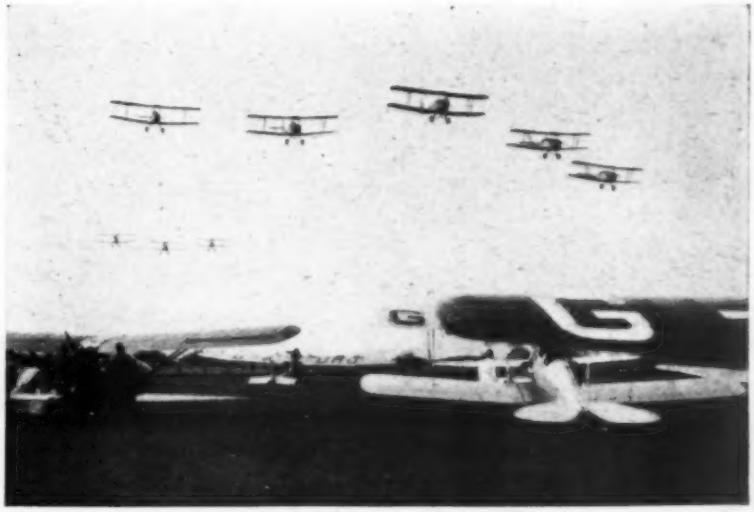
SIR JOHN D. SIDDELEY has been created a baron in the new Honours List. Until his retirement last June Sir John was chairman and managing director of Armstrong Siddeley.

NAUTICAL WEIGHT-LIFTER: The Italian Cant. Z.508 flying boat with three Isotta-Fraschini engines which has lately distinguished itself by securing various height records with heavy loads.

The French Regnier concern has completed a 450 h.p. air-cooled inverted vee-twelve engine with concentric airscrews (à la Fiat) and Roots supercharger.

Four R.A.F. machines under Air Commodore McLaughry and accompanied by Capt. Hamilton, representing the Governor of Aden, flew to Shabwa, which, prior to their visit, had been visited by only two Europeans.

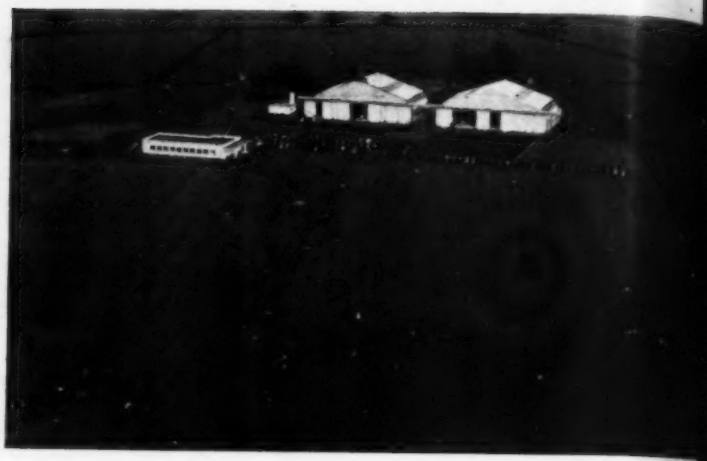
The Colonial Office announces that the Sultan of Kelantan proposes to commemorate the Coronation by making available a site for an aerodrome at Kota Bharu, in Kelantan, on the east coast of the Malay Peninsula, and by allotting money to provide for its development and maintenance.



BUSINESS and PLEASURE

Leicester's Coronation Air Display—and Some Observations on the Airport and Club

(Illustrated with "Flight" Photographs)



This aerial view of the municipal side of Leicester's Airport shows the first two hangars, and work proceeding on the terminal buildings.

PERHAPS because of the proximity of Empire Air Day, very few air displays took place during the Coronation celebrations. Leicester, however, was one of the exceptions, and the club there staged a very appropriate affair at the municipal airport.

The programme was given once in the afternoon and again at night. Dull weather and very low clouds limited the afternoon flying activities, but the spectators were able to see Drones and a ground trainer, a good display of low formation work and the odd spot of aerobatics by the Desford instructors on Tiger Moths, a fine flight by a petrol-driven model, and some sharpshooting of balloons from the club's Cirrus Swallow. Great interest was also shown in the "static display" staged by the Loughborough College (Aeronautical Section).

When prospects were looking definitely poor for the evening performance, the sky quite suddenly cleared, the sun came out and spectators arrived in large numbers. It was decided to run the air race at once and, handicaps having been worked out, two Drones, an Aeronca, a Tipsy, a Swallow, a Tiger Moth, Leopards and a Hornet took off at intervals. There ensued a quite exciting chase of the Drones round a short triangular course, the clubhouse municipal hangars being the close turning points. The race was finally won by Mr. B. H. Dowson, flying a Hornet Moth, with Mr. A. B. Bradley (Leopard Moth) second, both of Nottingham. Mr. J. I. Isherwood, of Leicester, was third on the Swallow.

The nine Tigers from Desford then appeared, led by Mr. George Lowdell, and were able to give a more varied and expert display. Later, when darkness fell, a brace of Air Dispatch D.H. Dragons co-operated in a searchlight display.

* * *

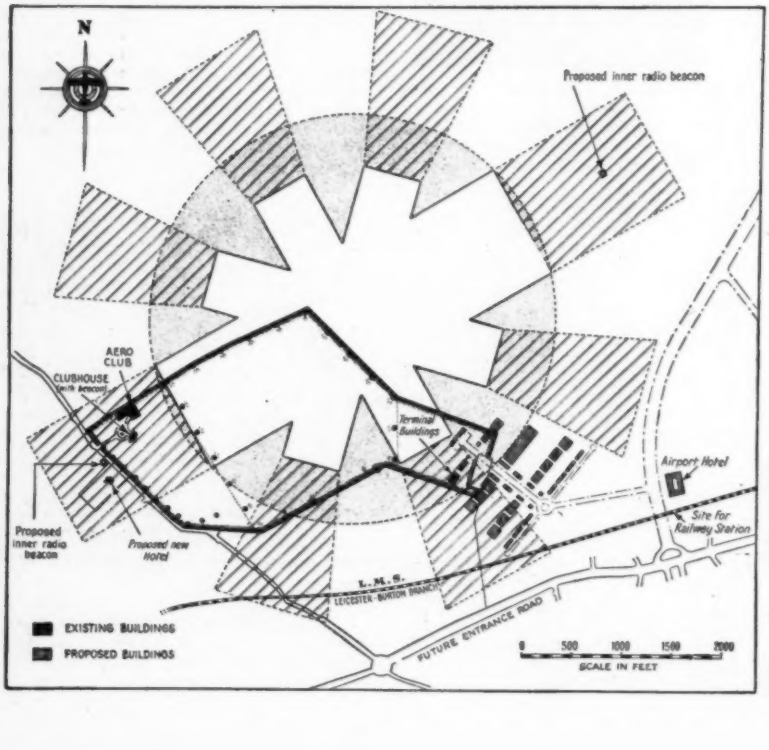
So much for a Leicester occasion; and now the opportunity seems a good one for saying a word or two on the airport and the club themselves.

It was in October, 1927, that Leicester first decided to investigate the possibility of preparing an aerodrome, partly through the suggestions of members of a very go-ahead and energetic council and because Leicester is a logical centre for many main air routes. The Air Ministry was approached and a list of some twelve essential features of an aerodrome site were considered before the selection of the present site. Work began and a licence was granted in March, 1935.

Leicester's airport has now many ideal properties from the flying point of view and specially for development as a servicing and manufacturing centre. A main double-line arterial road has been started and will run along one boundary. Light, power and water are already laid on. The distance is only three miles from the city centre, but the airport's position is on a raised plateau to windward of the city relative to the prevailing S.W. wind, and the height and area restrictions of the Maybury Report can all be satisfied.

The vast clearing, levelling and draining operations have produced a fine flying field. The grass is tough and firm and, in the experienced hands of the En-Tout-Cas (Syston) people, obviously thrives on the ammonia and potash salts and lime rationed to it—the Air Ministry test of driving a car at 20 m.p.h. over the surface without discomfort and the pressure test of application of 2½ tons/sq. ft. without permanent damage have all been passed.

Various considerations led to the



The Leicester Corporation own almost all the land shown in this plan, which indicates the proposed airport extensions and existing layout.

Proposed Landing Area
3 runways of 1,000 yards × 200 yards.
1 runway of 1,300 yards × 400 yards.

No obstruction above a slope of 1 in 15 measured from end of runway

No obstruction above 35ft. in these areas.

No obstruction above 100ft. between runway approaches.

Present landing ground and existing developed area.

A smart drive and club house with hangar for some ten machines are found on the club side.

Flt. Lt. R. L. Bateman, (chief instructor), Mrs. Bateman and the Airport guard.

Looking out from the control room, which is operated for the Corporation by the Club.

complete separation of the municipal and club sides of the aerodrome. The clubhouse, a sixty-foot-square hangar and six acres of land to the north-west, are rented for £273 per annum by the Leicestershire Aero Club on a thirty-year lease, and a nominal fee of 1s. per annum is paid for the use of the aerodrome. The club is at present running the control room and aerodrome for the Corporation. On the municipal side two large, heated Boulton and Paul hangars with a 120 × 350ft. tarmac apron (by the Mountsorrel Tarred Macadam Co., Ltd.) in front are still optioned by Crilly Airways. Work is nearing completion on the first sections of a modern single-storey building to house control, Customs, passenger accommodation, and all works offices. For night flying, G.E.C. boundary and obstruction lights, an illuminated wind tee, and a 3-kW. flashing beacon will be completed, and the clubhouse already has a 10-kW. 800,000 candle-power Chance shadow-bar floodlight and beacon surmounting the lounge. A wind "T" is set out in hurricane lamps on the flat roof, and orange lamps denote the boundaries.

For some undefined reason connected with wavelength appropriation, radio has so far been denied to the airport. Pilots requiring information call Heston, who 'phone Leicester and then carry on a triangular conversation—all most unsatisfactory. The fact that last week three machines carrying Coronation films, each flying via Castle Bromwich, finally found sanctuary at Leicester from the foul weather, supports the theory that a central airport is essential and logical at this point.

Several firms are investigating the possibilities of establishing factories on the available sites, and in this connection one well-known concern operating not very far away must not be overlooked—the B.B. Chemical Co., makers of "Bostik" sealing compound, which plays an important part in keeping aeroplane windows in and the rain out.

Flying interest in Leicester started in the very early days, and if one were to look in the issue of *Flight* for September 4, 1909, the decision to form an aero club would be found. Baron de Forest, who was at that time offering £4,000 for a cross-Channel flight, was elected president.

The present club owes a great deal to its president to-day, Mr. Lindsay Everard, M.P., who presented the Puss Moth, their first aeroplane, and promised a third aeroplane if a second were found; it was found, but the club wished to be a little self-supporting, and postponed the acceptance of another machine from Mr. Everard. Mr. Roy Winn (chairman of the flying committee) and Mr. Harry Purt, secretary of the Leicester Chamber of Commerce, by sheer persistence and organisation, brought the modern club into existence. Nor must the name of Mr. C. H. Bolton be left out as one who did much of the spade work.

The club, with a membership of 600, is on a firm financial basis, and the fleet is composed of a Cirrus Swallow, a Gipsy III Moth, a Tiger Moth, and a Miles Falcon recently acquired. There is also an arrangement with one member to use his private Miles Whitney Straight. Air Dispatch Dragons drop in from time to time, and at least one is usually housed at Leicester.

The chief pilot and instructor, Flt. Lt. R. L. Bateman, is the moving semi-resident force at the aerodrome; a gentleman of firm principles—coffee before beer, and smoking only from 12 noon to 12 p.m.—and a mine of information on the club, flying, and the countryside generally, including bird life and the ancient Roman town at Ratae, from which, no doubt, is derived the name of Ratby, the village adjacent to the aerodrome.

Personalities (left to right): Mr. C. Headley Briggs (committeeman, and commentator at the display); Ald. W. E. Wilford (ex-Lord Mayor); Mr. A. T. Gooseman, M.Inst.C.E. (City Engineer and Surveyor); Mr. J. Russell (ex-R.A.F.), Asst. City Surveyor.

PRIVATE FLYING

The two-seater Tipsy in action (see page 509).

Topics of the Day

Safety Gauges

NOW that we are becoming more accustomed to multiplication in the matter of control and instrument equipment I think that the time has come for light aeroplane manufacturers to incorporate one or two dials which are normally seen only on military and high-efficiency civil types.

Such instruments as thermo-couples and oil-temperature gauges need not be placed so as to litter an otherwise tidy dashboard—since they need only be examined on occasion—but they may provide information which will make all the difference between a forced landing of the genuine dead-stick or the "ten-minutes-to-look" variety.

Unfortunately, such items cost good money. Still more unfortunately, they are probably of greater value for machines of the inexpensive type, on which a small engine may easily be overloaded, than they are in the case of full-size machines, which have lots of reserve power provided by a well-proved and well-cowled engine.

An oil-pressure gauge will always tell its own story, but the difference between normal and over-hot readings is not very marked. A dial which will tell one at once if the hottest cylinder head in an engine is reaching pre-ignition temperature may save its cost in valves, pistons and plugs—if nothing else.

More than once, when flying a low-powered machine, I have noticed signs of pre-ignition after a longish period of slow, full-throttle flying, and in one case, through cooling deficiency in an experimental type, the engine lost several hundred revolutions and refused to stop when finally switched off. Some form of cylinder-head temperature indication would have warned me to ease back the throttle well before damage could have been done.

Cowling and Cooling

INCIDENTALLY, this may be a good moment to remind ultra-light aeroplane pilots that indefinite full-throttle flying is not good for any engine. The reminder applies especially in this case, because the temptation to overdrive a little fellow is so much greater—a fact which may explain why small engines are sometimes less reliable and require more maintenance than large ones. After one particular demonstration flight I saw steam spouting from the vent-pipe of a water-cooled machine—yet the cooling system in this case had proved itself to be thoroughly adequate for normal flying conditions.

So many pilots appear to forget that a cowling or radiator designed for a fairly steady 70 m.p.h. blast coming from a certain direction can be unsuitable for continuous work in different conditions. Once, too, I flew as a passenger with an experienced pilot who climbed his machine so steeply on full throttle that, from the front seat, at any rate, the most heart-rending knocks could be heard. A c.p. airscrew is not an infinitely variable gear.

Instrument Accuracy

RETURNING to the dashboard again, I think somebody ought to register a complaint about the indifferent workings of the instruments fitted to small machines. I don't think I can remember one single occasion when every dial in an ultra-lightweight has recorded the correct story. Usually the A.S.I. is the worst offender, and one is often told "not to take any notice of it below 60 m.p.h." Probably position error is the usual cause, but I can find less excuse for that kind of thing than I can for plain instrument badness.

If it is possible to arrange the pitot head on any normal light aeroplane so that the instrument registers fairly correctly right down to the stall, I can see no reason why this should not be possible on smaller types. If it is a nuisance not to know how quickly one is travelling it is even more of a nuisance not to know how slowly one is travelling. An approach which is based on control feel and the general appearance of the moving landscape is usually being made too fast, and the hold-off then covers about half the available landing area—to one's momentary shame, and quite apart from the possibility of making the touch-down on the hedge at the far end of an excessively small aerodrome surrounded by large trees.

The inexpensive type of altimeter is useful for telling one that the ground has been left by a reasonable margin—say five hundred feet—but is not much good for checking cloud-base height against the ground over which one is planning to fly. All the miniature compasses I have flown behind could only be laughed aside; they generally rotated at a high speed, and might, in the probable event of the failure of all other instruments, have been used to obtain an approximate idea of the number of revolutions being made by the engine.

I have yet to discover why the cheaper instruments so often fail to do their work. One would not expect scientific accuracy from them, but one might reasonably hope that they would register a fair average of prevailing conditions. In America it seems that there are two standards of instrument—those fitted to very cheap aeroplanes and those fitted to transport types. The latter work quite well; the former are there for show, and usually have to be replaced sooner or later. As far as A.S.I.s are concerned, the French idea of having one for cruising speeds and the other for approach and landing speeds has a good deal to recommend it. When approaching small aerodromes or fields and flying within a few miles an hour of the stall, it is pleasant to know that an instrument is available to provide an accurate additional check on one's sensations of vertical in relation to horizontal velocity.

INDICATOR.

(Right) Expanded for two, the Tipsy has lost none of its good looks. (Below) Mr. Macpherson of Fairey's, O/C general sales of Tipsy aircraft; Mr. E. O. Tips (designer); and Mr. Brian Allen, who is the chief distributor.

TIPSY SENIOR

The New Two-seater Tipsy Demonstrated : Flying the Latest Single-seater

BOTH as an inexpensive touring two-seater and as a possible training type the latest Tipsy, which made a temporary demonstration visit from Belgium last week, is distinctly interesting. Those who have handled the single-seater model have only to be told that the flying and control characteristics of the new machine are similar to, but a trifle less light than, the former to know all they really need to know about it from the pilot's point of view. Structurally, too, the machines are largely identical, though there has been a considerable cleaning up in the matter of detail and the fuselage has naturally had to be modified to suit the new circumstances.

Though the machine might be classed generally as a side-by-side seater, the Tipsy's occupants are, in fact (I will not say "appropriately"!), staggered in relation to one another, with the result that each has a very reasonable amount of elbow room—which is difficult enough to provide in the widest of fuselages. There are dual rudder pedals just ahead of the main spar and a central stick. When used for instruction an extension will be fitted to this control and a second throttle arranged on the left side so that it can be held quite comfortably by the instructor whose arm, in any case, is behind the pupil's back. In all probability, the production machines will be optionally enclosed, but the prototype is fitted with a deep curved screen which satisfactorily shelters the pilot, if not the passenger. Various changes, both in the matter of cockpit shape and furnishing, will be made in the production model and there is little point in either praising or criticising the accommodation as it appears at present. The two-seater model only flew for the first time a week or two ago and such details can only be settled in actual flying tests.

The machine is at present fitted with a four-in-line 50 h.p. Walter Mikron engine—and a very neat little installation it makes—but it has not yet been decided whether this unit will be fitted to the production models. It is unlikely, in any case, that these will be coming through Aero Engines' shops before the end of this year, and by then there may be one or two suitable engines to be obtained in this country. The Mikron is a most delightful little engine to fly behind and, all things considered, provides just the right sort of performance—with a take-off which is quite astounding, even in a flat calm such as prevailed during the demonstration. The maximum speed with this engine is as high as 124 m.p.h. and the price in the region of £400.

Naturally enough such an exceptional performance can only be obtained by the strictest attention to exterior detail, and the machine is as clean as the proverbial whistle. So much so that the production type will assuredly be fitted with manually operated split flaps.

TWO-SEATER TIPSY

50 h.p. Walter Mikron engine.

Maximum all-up weight	992 lb.
Disposable load	496 lb.
Maximum speed	124 m.p.h.
Cruising speed	100 m.p.h.
Stalling speed	46 m.p.h.
Ceiling	19,600 ft.
Range	500 miles.

Although it was not possible last Friday, for insurance and other reasons, to make more than a passenger flight in the new machine, Mr. Wesson brought over the latest single-seater with the new dual-ignition Sprite engine, and I managed to borrow this for a quarter of an hour or so while London's

One and two: The latest single-seater Tipsy (nearest camera) alongside the new two-seater.

Private Flying

smoke blew up from the north-east. My previous experience with the Tipsy had been confined to the original version with a rigid undercarriage, and the latest type is very different on the ground. Dual ignition, too, inspires one with confidence.

It is impossible to deny that the Tipsy is the most delightful of flying machines. Though the controls are light to the point of being without feel and are exceptionally powerful, there is no question of over-sensitivity. Full aileron, for instance, is necessary when entering and leaving vertical turns, and one can move both stick and rudder bar about quite roughly without coming to any harm. It would be hard to think of any machine in which the pilot feels more "part and parcel" of it. Care is required during the approach since speed is gathered very rapidly and the hold-off from an over-fast approach is almost indefinitely prolonged in a flat calm, but the view from the pilot's seat is so good that one is encouraged to loiter on the aerodrome boundary in a series of gentle gliding turns. Incidentally, too, the hold-off is prolonged only in time, and the distance covered is not very great. For small-field approaches it would probably be better to come in with a good deal of engine and as near to the stall—which is quite sudden—as one dares. That is a matter for practice and personal preference.

INDICATOR.

FROM the CLUBS and SCHOOLS

LONDON

THE London Aeroplane Club's flying time for last week was 53 hr. 35 min. New members were Miss J. W. Lebon and Messrs. R. A. Green and R. E. Burnham.

SOUTH COAST

The weather was rather bad last week so the number of flying hours at Shoreham dropped to just under thirty. Mr. Truran has taken on the work of instructor in Navigation, Meteorology, and so on, both for owners and for those taking their "B" licences.

BRISTOL AND WESSEX

Between April 23 and May 14 the weekly hourage totals were 37 hr. 10 min., 27 hours, and 25 hr. 10 min. respectively. A first solo was made by Mr. J. B. Nanda; Mr. J. H. W. Hill obtained his "B" licence; and new members were the Misses J. M. and P. U. Syng, Capt. A. Eskola, and Messrs. W. H. Watson and A. V. Kilburn. The subscription list in connection with the annual garden party prize money is still open; £25 has already been received.

YORKSHIRE

Despite several days of bad weather the flying carried out on Club machines last week totalled 31 hr. 10 min. Unfortunately, the machines scheduled to bring films to Yeadon on Coronation Day were unable to get through on account of thick mist and rain and it was not until Thursday afternoon that some of the films actually arrived. Mr. H. Audsley, an Air League "Young Pilots Fund" pupil, has obtained his "A" licence.

YAPTON

The times for the week ended May 15 totalled 32 hr. 30 min. with poor weather. New members are Miss Branton-Day and Messrs. R. E. L. Beere, F. Hajek, A. Murray Lees and A. Mungovan; the last two are taking the £15 "A" course. First solos have been made by Messrs. G. Hill and F. Hajek. Mr. D. Prentice has passed all the tests for his "B" licence. The Yapton Club has purchased a Monospar S.T.25 in order to be able to give twin-engined dual instruction. This brings the fleet up to six.

BORDER

Arrangements are well forward for Empire Air Day (May 29) at Carlisle. A comprehensive R.A.F. programme, augmented by events by the Border Club, will be the main feature of the day. An eye-witness account of the events is being broadcast by two members of the Club from North Regional at 8.50 that evening. Mr. E. Lund has joined as an observer member and first solos have been made by Messrs. W. Roddick and R. Todd. The Airport drainage scheme is now completed and with the exception of a few places where drains have not quite settled, which are marked by red and yellow flags, the whole airport is again in use.

HERTS AND ESSEX

The flying times at Broxbourne for the week ended May 7 totalled 109 hr. 59 min. The Club was closed on Coronation Day, and during the remainder of last week the weather interfered with flying on several days and 37 hr. 40 min. flying was logged. First solos were made by Messrs. A. W. J. Pettit and A. E. Hayes. Mr. A. Cundy completed his night flight from Croydon to Lympne, and Messrs. W. H. Hicks and P. Taplin covered the Croydon-Cardiff trip for their "B" licences. New members were Messrs. J. F. M. Wright, R. M. Lee, J. S. Pole, S. G. Blackaller, S. Arno, L. G. Mondin and W. S. Lovegrove.

CINQUE PORTS

In spite of the Coronation and the weather flying hours at Lympne totalled forty-five last week. The Club's Leopard, which was to fly Coronation photographs from Hendon to Manchester, had considerable difficulty in getting through to Hendon, and having arrived the pilot was told that his services would not be required as the country was already dotted with stranded aeroplanes. The Coronation and Whitsun holidays saw a considerable number of private owners in at Lympne clearing Customs for abroad, although the weather in the Channel delayed them considerably. One of the Club's "B" licence pupils, Mr. Clifford, completed his night flight and the repairs department carried out certain work on Mr. Llewellyn's Vega. This he collected on Wednesday prior to his departure for the Cape in due course.

C. A. S. C.

At Cambridge last week members flew a total of 5 hr. 25 min., while at Gravesend the figure was 6 hr. 40 min. The Kent squadron will hold its inter-squadron display, with competitions, at Gravesend next Sunday. Messrs. Haywood and W. J. Smith have joined the Corps.

EDINBURGH

During the last week of April the Edinburgh Flying Club put in 31 hr. 15 min. flying and a first solo was made by Mr. T. Sawers. Mrs. R. C. Shaw and Mr. D. J. Bogie joined the Club. Several members made an attack on Carlisle Airport on the occasion of the Border Club's Dawn Patrol. During the following week the flying total was 30 hr. 20 min.

BENGAL

In the absence of a pilot instructor and with the Club's only aeroplane under overhaul for most of the month, Club flying amounted to only 1 hr. 35 min. during March. Privately owned machines flew a total of 35 hr. 10 min., including several cross-country flights. A flying gymkhana, held on March 21, was well attended. Its success was largely due to the assistance of a Leopard Moth lent by Indian Air Survey and Transport and flown by Mr. R. C. Kemp.

HANWORTH

Bad weather somewhat curtailed the London Air Park Flying Club operations during last week, though 59 hr. 45 min. were flown. Aeroncas have been very popular and one was hired for a flight to Cardiff. New members are Mrs. A. Gazda, and Messrs. Keeling, Jarvis and Segonzac. The Club was, of course, closed on Coronation Day. The Leopard Moth is back in harness after C. of A. renewal.

CAMBRIDGE

The flying times at Marshalls' School for the week ended on May 16 totalled 100 hr. 35 min. Messrs. Wilson and Nicholson joined and Messrs. Timpson and Pringle completed their first solos. A normal cross-country was flown to Gatwick and the Monospar was flown to Manchester and the Puss Moth to Cardiff and Leicester. The weather was poor for three days of the week.

HAMPSHIRE

A total of 176 hours was flown by Hampshire Club machines during April and the following members qualified for their "A" licences: Countess Frijs and Messrs. A. White, B. Wardle and J. L. Gregory. During this month Mr. Lamplough carried out a night flight from Croydon to Southampton for his "B" licence, and Messrs. Kay and Lawrence took night landing instruction. In connection with Southampton's Coronation celebrations Mr. K. C. Winton, the chief instructor, gave a remarkable display of aerobatics in spite of low cloud, and later, flying the Leopard with Mr. Winning in a Gipsy Moth, gave a night display with the R.E. searchlights. The Club has arranged special pleasure flights over the Fleet in the Leopard during the Review.

BROOKLANDS

On Saturday there was an interesting ceremony at Brooklands when a challenge cup was presented by the oldest British flying club—Brooklands—to the youngest—the Lusaka Flying Club of Northern Rhodesia. Among the many people present were H.E. Major Sir Hubert Young, D.S.O., Governor of Northern Rhodesia, and Lady Young. The latter accepted the cup, which was presented by Capt. Duncan Davis, A.F.C., himself one of the earliest "B" licence pilots.

Whit Sunday was the occasion of the first of the year's landing competitions, which was won by Miss D'Anacar, who has had but four hours' solo experience. After the competitions the instructors were challenged to better the exhibition, but, having once throttled back their motors, these stalwarts were not permitted to glide outside the aerodrome boundary. Mr. L. Cliff put up the best show. On the following day, some two hundred overseas troops visited Brooklands and were shown round; no fewer than seventy of them made flights and all available "B" licence pilots were pressed into service for the occasion.

Mr. Cliff, incidentally, was reported to be the only pilot to deliver the Coronation films safely and to time. His job was to fly to Hull and the weather was so bad that he sometimes found himself flying at tree-top level.

WEATHER OR NO

With the Early Morning Newspapers to Paris : Modern Methods for Modern Conditions : Some Thoughts on Safer Transport Flying

By H. A. TAYLOR

IT was some time since I had had an opportunity of seeing the "works" of transport flying in the worst possible weather conditions, and when the opportunity occurred of making a trip in the control cabin of the D.H.86B, used by Wrightways on their early morning newspaper and freight service to Paris, I jumped at it for various good reasons. In the first place, minor changes are always being made in the technique of bad-weather radio operation, and this particular 86B is one of the most fully equipped machines in service at the present time in this country; in the second place I was to fly with Mr. J. W. Duggan, who has had a long experience of this particular service. With him, as it happened, was Mr. G. Brownrigg, who has also had a great deal of experience as a radio operator on the same service. They certainly work together in a way which suggests telepathy; actually, it is merely the result of long experience.

Although the weather was quite normally bad—we saw the ground for perhaps ten minutes or a quarter of an hour in all during the three-hour trip—there was never for a moment any suggestion of fuss or excitement such as is usually associated with the idea of long periods of instrument flying. The 86B, in fact, flies itself very satisfactorily, and if both the pilot and the radio operator know exactly where they are all the time there should be no reason for panic or melodrama. This particular machine is fitted, so far as radio is concerned, with R.T.E. material, including normal two-way equipment with the R.T.E. fixed-wave control panel, a rotating loop with homing indicator, and an ultra-short-wave receiver and indicator panel. Unfortunately for my curiosity, the machine had recently been modified and neither the loop nor the short-wave equipment was in proper working order; in any case, Croydon's beacon had elected to fade out on the previous evening. Later, I shall have more to say about such matters.

We were due to leave Croydon at 5.15 a.m., but a mail machine, inward bound from Cologne, was due at any moment, and the start was delayed until we heard that this machine had, in fact, been advised to return until conditions improved. The weather report gave the visibility at Croydon as 600 metres and the cloud height as 60 metres; elsewhere over here the visibility was nil, though at Beauvais it was given as 4 km. and at Le Bourget as 10 km., so we had nothing very much to worry about once we were across the Channel. Weather reports are proverbially pessimistic in any case; however, when the machine was coming through the cloud base near Paris this base was given at 1,200 m., while, in fact, our corrected altimeter reading was 100 m.—evidently the thick lower layer had not been noted! On the whole, the Continental met. people are generally considered to be slightly superior to our own.

At 6.15 we took off (as an American pilot once said to his tired co-pilot, "Where did you get that 'we' stuff?"

In this case the pronoun simplifies the narrative and is not used to suggest that I did either the flying or the operating), entered the 60-metre ceiling almost before Purley Way had been crossed, and worked up to an operating height of 2,500 ft., where there was something resembling an horizon between two cloud layers, and the ground could be seen in occasional glimpses. Mr. Brownrigg let out the trailing aerial and tested his set with the usual report of height, speed and destination. Later he was to save other people a lot of trouble and show himself as the really intelligent operator by listening-in to other machines and to the broadcast weather reports. Some operators consistently ask for such information as can easily be picked up in this way.

Knowing the route so well, this team do not often ask for fixes either. When we should have been crossing the English coast in each direction, bearings were demanded from both Croydon and Lympne, and our position was approximately checked. In one case the two bearings were 140 and 241 (second class) and in the other 147 and 213. This information was all that was needed by Mr. Duggan to know his position, and it is significant that before these bearings were asked for during the return flight, and after a blind period of half an hour or so, I was asked to keep a look-out for the coast in any break down below; almost as I was asked I obtained a brief glimpse of a line of surf.

With the weather fairly clear at Le Bourget we came in directly on a QTE of 322, and a final QDM of 161 to get an exact line on the aerodrome. When the ceiling is really low and/or the visibility very poor a version of the time-honoured Z.Z. system is still used, though the V.H.F. system over there should by now be in working order—or nearly so; the last time I saw their beacon it had been experimentally laid out, after initial failures, in a field some half a mile or more from the landing area. The D/F system of approach involves the use of two gonio huts on a line towards the longest run of the aerodrome, which lies approximately north and south and is about a mile and a quarter in length. An approaching machine is flown away beyond the aerodrome in a southerly direction at a height of about 300 m. and is then brought in on a QDM of 13 deg. When the first gonio hut is crossed the "motors over" is given, and the pilot then flies in on the same bearing towards the second hut (which is on the aerodrome boundary), while losing height with the knowledge that he is only a mile or two from the aerodrome. We were satisfied on this occasion to receive the usual weather report with a millibar setting for the sensitive altimeter.

In on Bearings

The return journey was a trifle more eventful, though not in the sense of being in any way difficult. After crossing the French coast (according to calculations—we never saw it) the Croydon weather report read: QBA 2 km, QBB 230 m. 9/10, 1,013.4 mbs., which, being interpreted, meant that visibility was 2 kilometres, the sky was almost completely obscured with cloud having its base at 230 metres, and the barometric pressure (for altimeter correction) was 1,013.4 millibars. Not *too* good, but safe enough for a properly equipped machine. Later, the cloud-base descended, as it happened.

When almost ready to enter the controlled zone we were told that our QGP, or landing turn, was No. 2—another machine was just coming in. A moment later we were asked to change over to controlled-zone frequency and gathered that we could come in. Not so, however; the fact was that there was so much congestion on the "outside" air that the zone equipment and operator had to attend to us. After doing a few "rate three" turns somewhere over south of Westerham we got our QGP One and set off on a magnetic course of about 350 deg., receiving rapid-fire QDMs (magnetic courses to steer) from the Croydon control. These, as a matter of interest, were: 357, 358, 351, 353 and 344. A moment later the "motors over" was received, the throttles were closed, and we saw the ground at 400 ft., just half a mile to the north-east of the aerodrome. And so home.

On that trip, for reasons outside their control, the crew were simply using the normal blind-flying instruments and two-way radio equipment. If any of the former had broken down, Mr. Duggan would still have had the others to go on with; if his venturi had iced-up he would have had his manifold to provide the necessary depression for their operation. But if, by any chance, the transformer or any part of the radio system had failed we should have been helpless until such a time as Mr. Brownrigg had done some work on it.

Essential Duplication

My cry, in the interests of safer transport flying is, and has always been, for duplication in all essential equipment. Not direct duplication, but the arrangement of equipment so that the failure of one item does not leave the pilot stranded in mid-air. On any other morning this machine of Wrightways would have been in as good a position as any. The V.H.F., or ultra-short-wave, receiving equipment is quite a separate affair, and any failure would have allowed the pilot to come into an equipped airport either on bearings or on the short-wave beam. Even so, it might not have been possible for him to navigate with sufficient accuracy to get into the area of the beam signals if his medium-wave outfit had gone out of action, for instance, over the middle of the Channel. These remarks cast no slur on the manufacturers of radio equipment; even the very best can fail under the arduous conditions imposed in every-day air transport. A battery will not work for long, either, at steadily increasing pressure after the generator has broken down.

Mr. Duggan's own idea, incidentally, is worthy of mention. He considers that, in addition to the normal radio equipment and any short-wave receivers for approaching in poor visibility, every machine should have a cheap homing receiver, and that every airport and aerodrome should have a beacon which is constantly transmitting on some frequency which would not upset normal transmissions. If the airport radio operator then found that he was receiving no reply from any particular machine, he could take it for granted that its radio had failed and transmit a message to say that he was arranging to keep the controlled zone clear for an approach and landing by this machine. This message would be picked up by the operator on the auxiliary receiver. In the event of such rare failures it would be a small matter to arrange Turn One for the crew of the unfortunate machine, and the pilots of others would be the first to admit that a little waiting, much as they all hate it, would be in a very good cause.

In any case, I repeat, every instrument and piece of navigational equipment in every transport machine should be complementary rather than vital. The failure of any single item should not mean a crisis.

PROTECTION by DEPOSITION

THE "Fescol" process for building-up and protection of metals has been tested and approved by the Air Ministry, Admiralty and War Office, and is now in wide and general use. The three metals most commonly deposited by the process are nickel, chromium and cadmium, and of these chromium has the widest application to new construction, due to its numerous useful qualities and the variations possible in hardness and thickness of deposit.

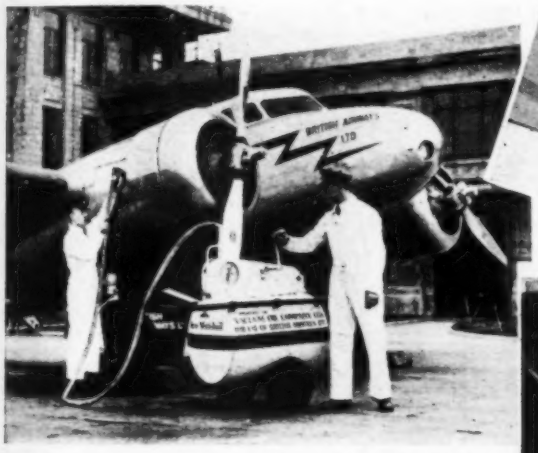
This special process can be used for producing a bright or decorative finish, a heavy deposit for subsequent grinding, a medium heavy deposit, or the special "Millichrome" finish. All these types of deposit can be used with advantage in aircraft on such parts as spinners, oil pipes, stub axles, fuel-pump spindles, wing-locking, locating or hinge pins, and on many internal fittings.

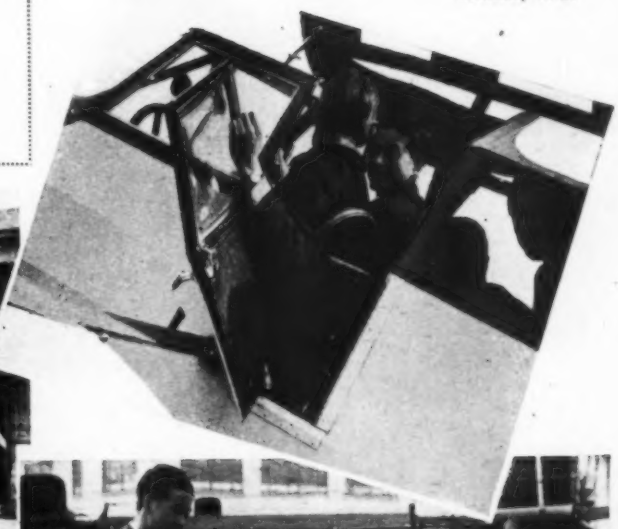
A folder giving details of method and uses of the process can be obtained from Fescol, Ltd., 101, Grosvenor Road, Westminster, London, S.W.1.

CIRRUS-MINOR-ENGINED, this Latvian V.E.F. J-11 monoplane recently made a circuit of its native country in 5 hrs. 20 mins. for the 655 miles, including several demonstration stops; the average flying speed was 125 m.p.h. The machine is shortly coming to England, and those interested in demonstrations should write to Mr. Janis Vitols, 24, Queensborough Terrace, London, W.2.

PICTORIALLY SPEAKING . . .

Aeroplanes and Personalities in the News





CLEAN AND SMART: A British Airways' Lockheed Electra being filled up with engine oil from one of the Vacuum Company's new portable 50-gallon dispensing units. A rotary pump delivers oil, *via* a Victory meter calibrated in pints, at 2-3 galls./min. There are several ingenious features.

"HERE ENDETH THE LESSON": Flt. Lt. Christopher Staniland, O/C. flying at the R.Ae.S. Garden Party, appears to be delivering a homily to the assembled pilots, among whom will be recognised Messrs. Field-Richards, Wilson, Brie and Brian Allen.—(*Flight* photograph.)

"DIVINE WIND'S" crew see something of British aviation: Messrs. Iinuma and Tsukagoshi, famed for their 100-hour flight from Tokio, recently enjoyed the hospitality of that section of the Industry which centres on Hanworth. They are seen greatly intrigued by Mr. Kronfeld's exposition of his ground trainer and (above) off for a trip with Mr. R. Somerset in a Monospar. They were also introduced—by Mr. R. A. C. Brie — to rotating wings.

THE ASPIN ENGINE TAKES SHAPE

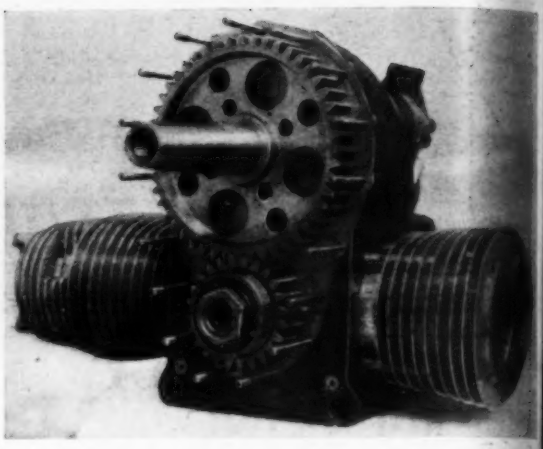
Four-cylinder Flat-twin Aero Unit in Hand

IN *Flight* of February 11 there appeared a reference to the Aspin engine design and to the startling claims of its inventor. Progress is now being made with the first aero engine embodying the same principles.

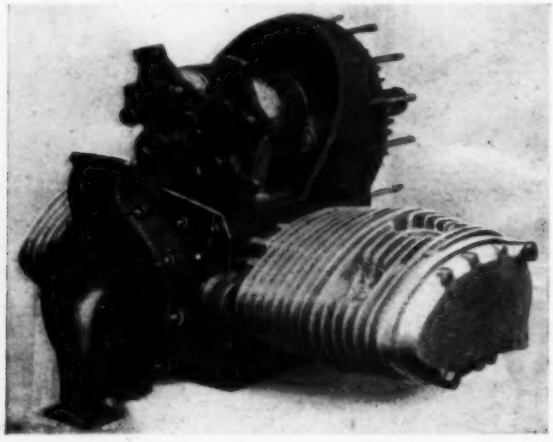
The engine is an air-cooled horizontally opposed four-cylinder of 1,731 c.c., and it will develop about 80 b.h.p. at 5,000 r.p.m. on a 9-10 to 1 compression ratio; a 2 to 1 reduction gear is incorporated. These figures are dictated by the particular purpose for which the engine will be used; it can run at much higher speeds and compression ratio to develop 100 b.h.p., when, of course, a different reduction gear ratio would be needed.

While the first unit is being built experiments have been going on with the 250 c.c. single-cylinder engine already illustrated, and a prolonged test is being carried out against an airscrew driven through chain reduction gearing which reduces the engine speed of 5,000-5,200 r.p.m. to 1,430-1,500 airscrew r.p.m. At the higher speed the engine develops approximately 18 b.h.p.

A remarkable feature of the engine is the small amount of exhaust noise even when the exhaust pipe is removed. The fact that the exhaust is comparatively cool and flameless bears out the claim that the combustion is practically complete. No sign of flame can be seen when looking directly into the open exhaust port, while at 5,000 r.p.m. it is possible to pass the bare hand slowly across the port at a distance of two or three inches without discomfort. As the safe speed of the airscrew was exceeded at 5,500 r.p.m. engine speed it was only possible to demonstrate the extraordinary capabilities of the engine for revving by slipping the transmission clutch, when the rev.-counter at once jumped to 8,000 r.p.m.



This 1,731 c.c. Aspin flat-four aero engine, now nearing completion, has been developed from a 250 c.c. single-cylinder experimental unit which, coupled to a 5ft. 3in. airscrew, has produced 18 b.h.p. at 5,000 crankshaft r.p.m. and has run for 620 hours.



Another view of the new flat-four. At the moment it is impossible to reveal its method of operation.

At the time of our visit the engine had run for a total of 620 hours without adjustment. Periodic stops were being made for inspection, but the chain transmission and the airscrew leading edges and tips were showing more signs of distress than was the engine. The piston rings were probably needing renewal, however, but it was intended to complete 1,000 hours running.

This 250 c.c. unit has a 14 to 1 compression ratio, and the test has been carried out on Shell-Mex commercial grade spirit (67 octane) to which in the later stages up to 40 per cent. of paraffin has been added.

Under these conditions the sparking plug showed no signs of distress, although it was an ordinary three-point Lodge with steatite insulator as used in touring car engines. The fuel consumption throughout the test has been between 0.34 and 0.35 lb. per b.h.p. hr.; on B.P. Ethyl the figures are 0.32 to 0.33 lb. per b.h.p. hr. at about 5,000 r.p.m., developing 18 b.h.p. These figures are perhaps the most startling of all.

At present it is not permissible to refer to the internal construction whereby these results are achieved. The development work is being carried out by F. M. Aspin, Ltd., Egyptian Mills, Elton, Bury, Lancs.

AERONAUTICAL PATENT SPECIFICATIONS

(The numbers in brackets are those under which the Specifications will be printed and abridged, etc.).

(*Published April* 29, 1937.)

18324. ECLIPSE AVIATION CORPORATION: Mechanism for indicating the movement and/or position of adjustable mechanisms on aircraft (463,400).
20900. COWEY, L. E., AND EUGSTER, E. J. P.: Aeroplane landing gear (463,401).
24261. ARMSTRONG WHITWORTH AIRCRAFT, LTD., SIR W. G., AND LLOYD, J.: Cooling of aircraft engines (463,474).
29728. HEINE, H. (Trading as HEINE MOBELFABRIK PROPELLER-WERK, H.): Means for mounting wooden airscrew blades (463,535).

(*Published May* 6, 1937.)

27573. KRONFELD, R.: Instructional device for aircraft pilots (463,957).
28243. FAIREY AVIATION CO., LTD., and FORSYTH, A. G.: Variable pitch propellers, specially for aircraft (463,737).
29277. OEHMICHEN, E. E.: Device for stabilizing apparatus for aerial navigation (463,983).
29509. FAIREY AVIATION CO., LTD., FORSYTH, A. G., and PERT, G. J. SMITH: Supercharging internal combustion engines (463,984).
29509. FAIREY AVIATION CO., LTD., and FORSYTH, A. G.: Variable pitch propellers, especially for aircraft (463,985)
29850 WILLIAMS, G. H. KREASEL: Dirigible craft such as ships, aircraft, and the like (463,881).
30494. BRISTOL AEROPLANE CO., LTD., and FRISE, L. G.: Retractable landing gear for aircraft (463,739).
30731. BRISTOL AEROPLANE CO., LTD., and FRISE, L. G.: Retractable landing gear and the like for aircraft (463,807).
34637. BENDIX AVIATION CORPORATION: Fluid compositions, especially for use in hydraulic apparatus (463,993).

(*Published May* 13, 1937.)

25501. NASH, A. F.: Seats for gunners or operators of other instruments in aircraft, particularly aeroplanes, and in other vehicles (464,399).
28457. CIERVA AUTOGIRO CO., LTD., and BENNETT, J. A. J.: Rotary blades or wings for aircraft (464,293).
28585. SUPERMARINE AVIATION WORKS (VICKERS), LTD., and KIMBER, W. G.: Wing-tip floats (464,408).
29396. ELLOR, J. E.: Inter-coolers for superchargers of internal combustion engines (464,348).
30733. BRISTOL AEROPLANE CO., LTD., and PONTING, R.: Retractable landing gear for aircraft (464,144).
1083. BERTHIEZ, C. W.: Variable-pitch screw propellers (464,224).
6724. FAIREY AVIATION CO., LTD., and LOBELLE, M. J. O.: Heat exchanging apparatus such as oil coolers and radiators for internal combustion engines for aircraft (464,165).
19431. SCHNEIDER and CIE, and FIEUX, J.: Gyroscopes (464,315).
23233. MESSERSCHMITT, W.: Metal aeroplane bodies (464,249).
21785. SHORT BROS. (ROCHESTER AND BEDFORD), LTD., and PARKES, D. L.: Control surfaces of aircraft (464,184).
24839. SIEMENS APPARATE UND MASCHIENEN GES.: Gyroscopic apparatus for determining the inclination of a plane (464,193).
28860. SPERRY GYROSCOPE CO., INC.: Gyroscopic directional and similar devices (464,263).
8485. FAIREY AVIATION CO., LTD., and FORSYTH, A. G.: Variable-pitch propellers, especially for aircraft (464,203).